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Title: Results of analytical tests on FFI 2003 sediment cores				
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<p>Summary:</p> <p>Seven gravity cores collected by FFI in the summer of 2003 have been profiled with the X-ray inspection system (XRI) and logged for P-wave velocity, bulk density and magnetic susceptibility using multi-sensor core logger (MSCL). Sediment cores were opened after these non-destructive analyses, sedimentologically described and undrained shear strength was measured on selected intervals. The cores were also subsampled for determining water content, wet density, dry density and grain-size characteristics.</p>				
Keywords: Marine geology		Seabed sediments		Sedimentology
Grain size		Sediment density		Geotechnical properties
Physical properties				

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Fig. 1. Ternary plot of all grain size analyses. Upper diagram is a close-up of the plot area with the majority of data points (bordered by red lines).

Fig. 2. Correlation diagram for MSCL bulk density and wet density, obtained by determining the weight of known sample volume. Solid line shows the expected correlation; dashed line indicates the offset of 0.3 g/cm^3 .

APPENDIX

Appendix 1. Stratigraphic profiles of X-ray images (XRI), P-wave velocity, bulk density, magnetic susceptibility, water content, wet density, dry density, undrained shear strength, and median grain size.

Appendix 2. Cumulative grain-size distribution plots and statistical characteristics of individual samples. Note that sample IDs show the core numbers and subsampling depths, i.e. sample S3A-1_10 stands for the subsample collected from 10 cm depth of core S3A-1.

1 INTRODUCTION AND MATERIALS

This report presents results of analytical tests undertaken on 7 sediment cores collected by FFI. The objective of these analyses is to provide sedimentologic and sediment physical properties characteristics, which can potentially be related and/or correlated with sediment acoustic parameters.

2 METHODS AND RESULTS

The laboratory procedures with the sediment cores involved (i) stratigraphic profiling with an X-ray inspection system, (ii) stratigraphic profiling for P-wave velocity, sediment bulk density and magnetic susceptibility using a multi sensor core logger (MSCL), (iii) lithostratigraphic description, (iv) grain-size analysis, (v) determination of geotechnical and physical properties of sediments. Descriptions of methods/procedures are given below. Figures 1-7 in Appendix 1 show compilations of all obtained results and illustrate down-core variations of studied parameters. All tests were carried out at NGU except MSCL logging that was undertaken at the University of Bergen.

2.1 X-ray inspection system (XRI)

The images of the XRI system reflect variable X-ray absorption (transparency) of different sediment components. The XRI system consists of an X-ray tube and an image intensifier that converts invisible X-rays into visible light. A CCD camera is used to capture the visible image. The size of an XRI image depends upon specific settings, typically covering 10-15 cm long sediment intervals. The sediment core is placed between the X-ray tube and the image intensifier; different core sections can be inspected by sliding the assembled X-ray tube and image intensifier along the core. X-ray transparency of a sediment is strongly influenced by the grain-size and the images are generally lighter for the fine-grained sediments and darker for coarse-grained sediments. XRI is a handy, non-destructive method to study the texture and structure of sediments, to characterize the distribution of gas pockets, shells, wood fragments and clasts, and to interpret the disturbances caused by bioturbation, gas escape or shear. The possibility to rotate the core simultaneously with imaging facilitates detailed geometric analyses of specific structural features.

In Appendix 1, the XRI documentation is given as sequences of digital images where each individual image corresponds to ca. 13 cm sediment intervals. The scale at the side of the images shows the depth in centimetres from the sediment surface or from the core section top in case of multiple sections. Individual images from all cores have been montaged to provide the complete XRI sequence. The enclosed CD contains 2 video clip files (SC3-2-sec1 and SC3-2 sec2) that were obtained from both sections (upper - sec1 and lower - sec2) of core SC3-2 while steadily moving the assembled X-ray tube and image intensifier along the core.

2.2 Multi sensor core logger (MSCL)

The GEOTEK manufactured Multi Sensor Core Logger (MSCL) at the University of Bergen was used to study physical properties of sediments by means of gamma-ray density, P-wave velocity and magnetic susceptibility. The MSCL consists of a conveyor system, a central unit assembly including three sensors, a microprocessor and a computer. The conveyor system has two track sections, mounted and aligned on either side of the central unit, and a belt driven pusher block which is driven in either direction by a stepper motor and gear box assembly. The central unit assembly incorporates a compressional wave (P-Wave) logger, a gamma ray attenuation logger and a magnetic susceptibility loop. Automation is achieved through the use of an internal processor, interfaced with the rack-mounted computer that controls the entire running process and stores data.

Up to 140 cm long core sections are placed on the right hand track with the top located at the reference position. A conveyor system automatically pushes each core section through the sensor array (incrementally past gamma ray attenuation logger, the p-wave logger and through the magnetic susceptibility coil) with measurements being taken at spatial increments as defined by the user; 0.5 cm and 1 cm step-sizes were used in this study. The computer controlling the conveyor also controls the sensors, so that all data are automatically correlated. Adjacent core sections are loaded on to the conveyor by the user when prompted by the software commands. In this way a complete core can be logged in a continuous process while the raw and processed data are displayed graphically in real time on the monitor. Complete control of the graphic display is provided, both in terms of the presentation and processing protocols. Both raw and processed data are saved in formats suitable for exporting to other software environments for further data manipulation or data presentation. Spreadsheets with processed MSCL data for all seven cores are given as Excel files on the enclosed CD.

2.2.1 Gamma ray density

Density is determined by measuring the attenuation of gamma rays through the cores. The gamma ray attenuation unit comprises a 10 millicurie Cesium-137 capsule (housed in a 150 mm diameter primary lead shield) with both 2.5 and a 5.0 mm collimators and a sodium iodide scintillation detector (housed in a 150 mm diameter collimated lead shielding to minimize any background radiation). A density resolution of better than 1% depending upon counting time used and core condition is normally achieved. The source and detector are mounted diametrically across the diameter of the core.

A narrow (pencil size) beam of gamma rays with energies principally at 0.662 MeV is emitted from the Cesium -137 source and passes through the diameter of the sediment core. At these energy levels Compton scattering is the primary mechanism for the attenuation of the gamma rays in most sedimentary material. The incident photons are scattered by collision with electrons encountered in the core and there is a partial energy loss. This attenuated gamma beam is measured by the Sodium Iodide detector. The Compton scattering of the photons is directly related to the number of electrons in the path of the gamma ray beam. The bulk density of the sediment is calculated by comparing the attenuation of gamma rays through the

sediment core to the attenuation of the gamma rays through a standard of aluminium density calibration billet, mounted into the liner of exactly the same type as the sediment core. However, the plastic liner used to obtain the studied sediment cores had unusually small diameter to fit any of calibrations billets supplied by the MSCL manufacturer. In order to be able to run the calibration this particular liner, a special aluminium billet was designed.

However, comparisons of MSCL bulk density results with below described wet density measurements have revealed systematic inconsistencies between different methods; these methodological problems are discussed in section 2.5.2.

2.2.2 Magnetic susceptibility

The magnetic susceptibility Bartington loop (150 mm) sensor (MS2B) is used in the MSCL system. A low intensity non-saturating alternating magnetic field is produced by an oscillator circuit in the sensor loop. Changes in the oscillator frequency caused by the sediment in the sensor loop are measured and converted into volume specific magnetic susceptibility values (SI units). The magnitude of the magnetic susceptibility values is dependent on the type of sediment, content of magnetic minerals and the volume of sediment within the coil. Identical cores of varying diameters will give different magnetic susceptibility values but will show the same down core profile. The calibration of the magnetic susceptibility loop, performed using a standard of known magnetic susceptibility, gives 5% calibration accuracy.

Density and magnetic susceptibility profiles shown in Appendix 1 display a general correspondence of these two parameters. However, density signal is obtained from thinner (< 1 cm) sediment interval compared to magnetic susceptibility (4-6 cm thick interval) hence the density logs have proven to be more specific and useful defining stratigraphic boundaries.

2.2.3 P-Wave velocity

The P-Wave logger system consists of two rolling compressional wave transducers (PWT), with soft couplings and a centre frequency around 220 kHz. These PWT's are spring-located on either side of the core to generate and detect short ultrasonic pulses. A short 220 kHz compressional wave pulse is produced at the transmitting transducer at a repetition rate of 1 kHz. This wave pulse travels through the core and is detected by the receiving transducer and the time of flight of the wave pulse is measured. Timing measurements have an accuracy of 50 ns providing velocity accuracy of about 0.2%, depending on core thickness and condition. Calibration can be achieved using a length of core line filled with distilled water of known temperature and velocity. The p-wave travel time is corrected for the P-wave travel time delay caused by the core liner and the electronics of the system.

P-wave velocity logs given in Appendix 1 show that most of the velocity values cluster around ca. 1600 m/s, consistent with the expected values for clayey-silty sediments. However, some parts of cores, most frequently the upper portions, show occasionally scattered profiles with values spread over the wide range. These abrupt jumps on P-wave velocity profiles are evidently not controlled by changes in the sediment character, but most probably reflect bad contact and/or open, air-filled spaces in the sediment liner (air-filled spaces were often observed in between liner wall and core sample) that blunder the measurement.

2.3 Lithostratigraphic description

Lithostratigraphic description was undertaken on split cores that were obtained by cutting through the liner plastic lengthwise and pulling a steel wire through the sediment. The stratigraphic logging focused upon sedimentary structures and texture.

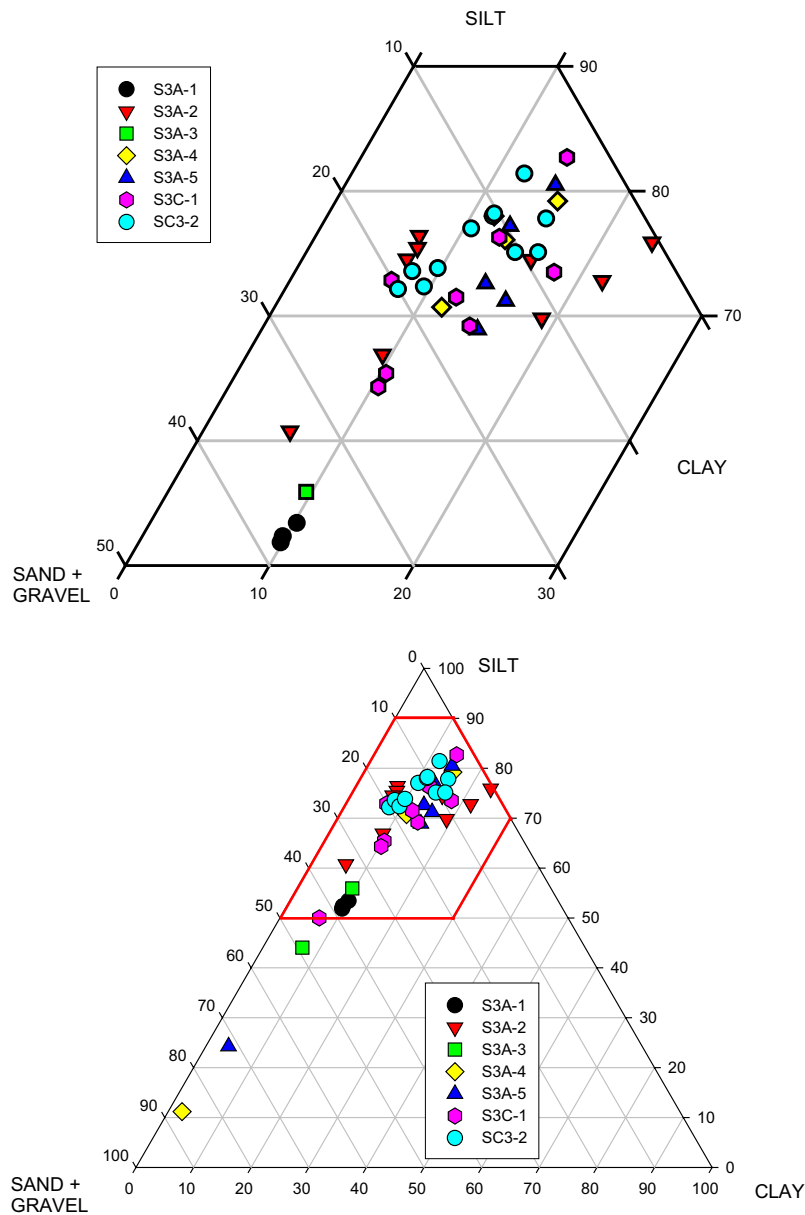


Fig. 1. Ternary plot of all grain size analyses. Upper diagram is a close-up of the plot area with the majority of data points (bordered by red lines).

2.4 Grain-size analyses

For grain size analyses ca. 2 cm thick sediment slices were typically obtained from the following sediment depths depending upon the core length; 10, 25, 50, 75, 100, 125, 150, 175, 200 and 225 cm. Occasionally, up to 5 cm deviations from this sampling scheme were allowed if the desired sampling interval overlapped with the stratigraphic boundary. Altogether 45 samples were analysed using sieving for fractions coarser than 2 mm and laser diffraction technique using Coulter LS 200 for fractions finer than 2 mm. Samples were oxidised with H₂O₂ to remove organic matter prior to analyses. The sample suspensions used in Coulter LS 200 were dispersed in ultrasonic bath.

Figure 1 shows the distribution of all grain size results on the ternary plot of clay (<2 µm), silt (2-63 µm) and sand-gravel (>63 µm). Stratigraphic variations of median grain size are given in Appendix 1. Complete sets of obtained grain size characteristics are found in Appendix 2.

2.5 Determination of geotechnical and physical properties of sediments

The sampling scheme (10 cm, 25 cm, 50 cm etc.) deployed for grain size analyses was also used to study the geotechnical and physical properties of sediments and the down-core trends of these parameters.

2.5.1 Undrained shear strength

The Falling Cone apparatus was used to measure sediment shear strength. The split core was placed underneath the cone holder with the tip of the cone touching the sample. The penetration depth of the cone into the sediment after releasing the cone is proportional to the undrained shear strength. Note that the values of undrained shear stress may bear a systematic error due to compaction and dewatering during transport and storage prior to analyses.

2.5.2 Water content, wet density and dry density

These parameters were determined with the aid of a thin-wall steel cylinder with known volume and weight. This cylinder was inserted into the sediment and known volumes of wet, undisturbed sediments were subsampled. Weights of wet and dry (drying at 105 °C for 24 hours) subsamples, combined with the known volume, allowed calculating water content, wet density and dry density according to the following formulas:

$$\textit{Water content} = \textit{Weight of pore water} / \textit{Weight of dry sediment}$$

$$\textit{Wet density} = \textit{Weight of wet sample} / \textit{Volume of wet sample}$$

$$\textit{Dry density} = \textit{Weight of dry sample} / \textit{Volume of wet sample}$$

Wet density values obtained by determining the weight of known volume should ideally coincide with the MSCL bulk density values. Figure 2 shows the correspondence between wet and bulk densities, and illustrates that MSCL bulk density values are systematically higher

than wet density values. All data points except one sandy-gravelly sample from S3A-4 display a systematic ca. 0.3 g/cm^3 offset (Fig. 2).

During calibration a uniform density and related attenuation capacity of the gamma rays were assumed for aluminium billets supplied by the MSCL manufacturer and the aluminium billet that was made for the purpose of this particular study. This may not have been the case, and it is possible that the newly made calibration billet has higher gamma ray attenuation capacity in comparison to the original MSCL billets. This difference in gamma ray attenuation capacity may have thus caused slightly wrong calibration and resulted in systematically elevated (by ca. 0.3 g/cm^3) MSCL bulk density values.

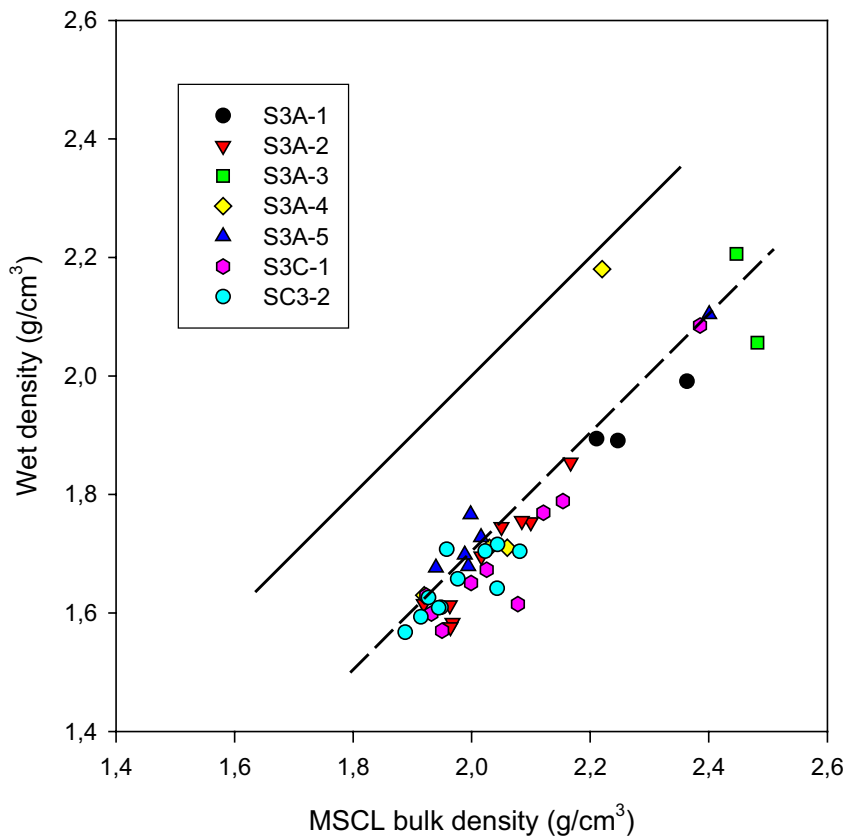


Fig. 2. Correlation diagram for MSCL bulk density and wet density, obtained by determining the weight of known sample volume. Solid line shows the expected correlation; dashed line indicates the offset of 0.3 g/cm^3 .

APPENDIX 1

Stratigraphic profiles of X-ray images (XRI), P-wave velocity, bulk density, magnetic susceptibility, water content, wet density, dry density, undrained shear strength, and median grain size.

S3A-1

Lithology

XRI

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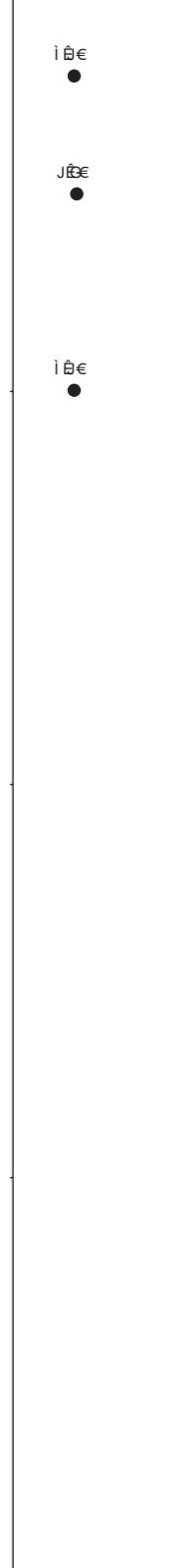
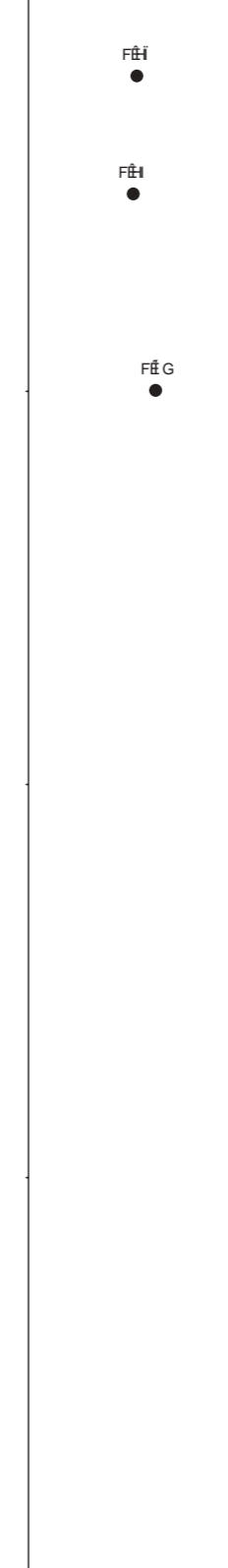
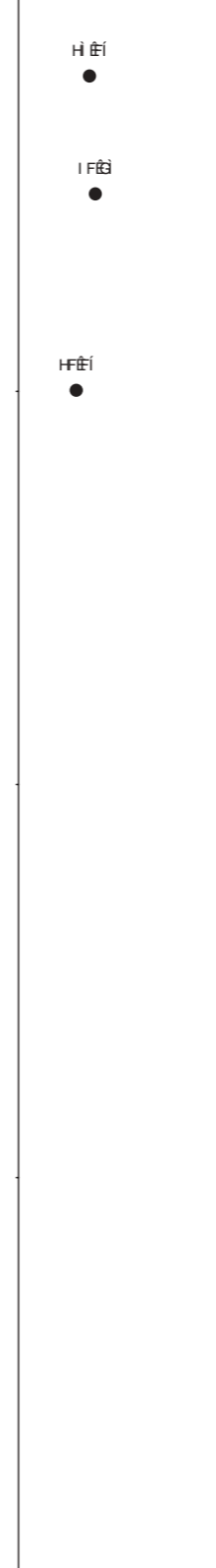
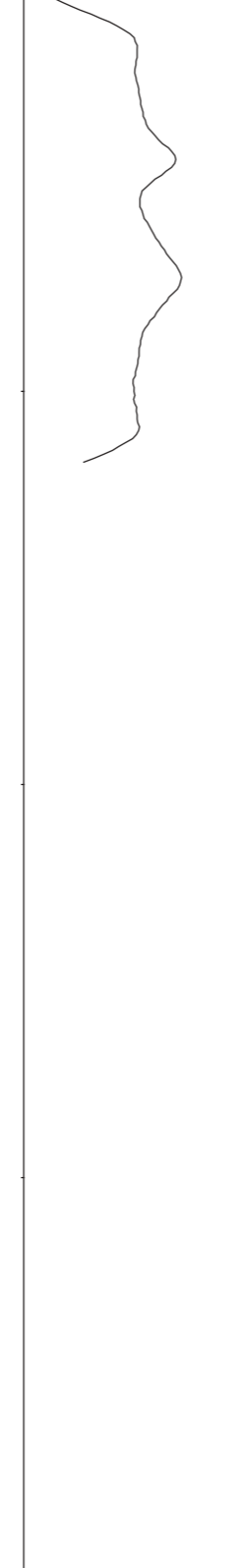
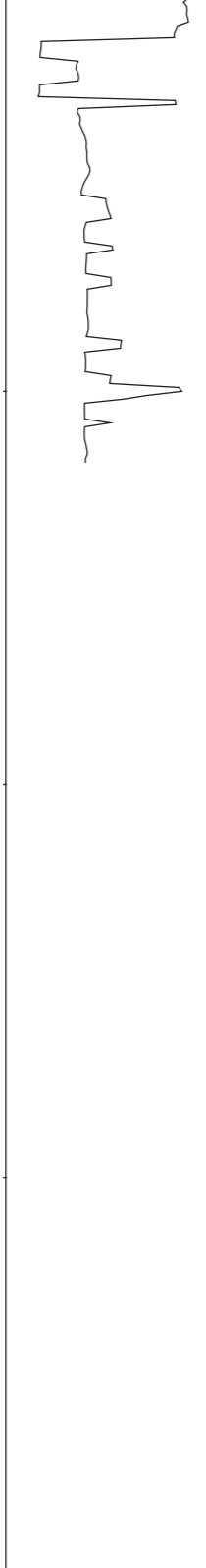
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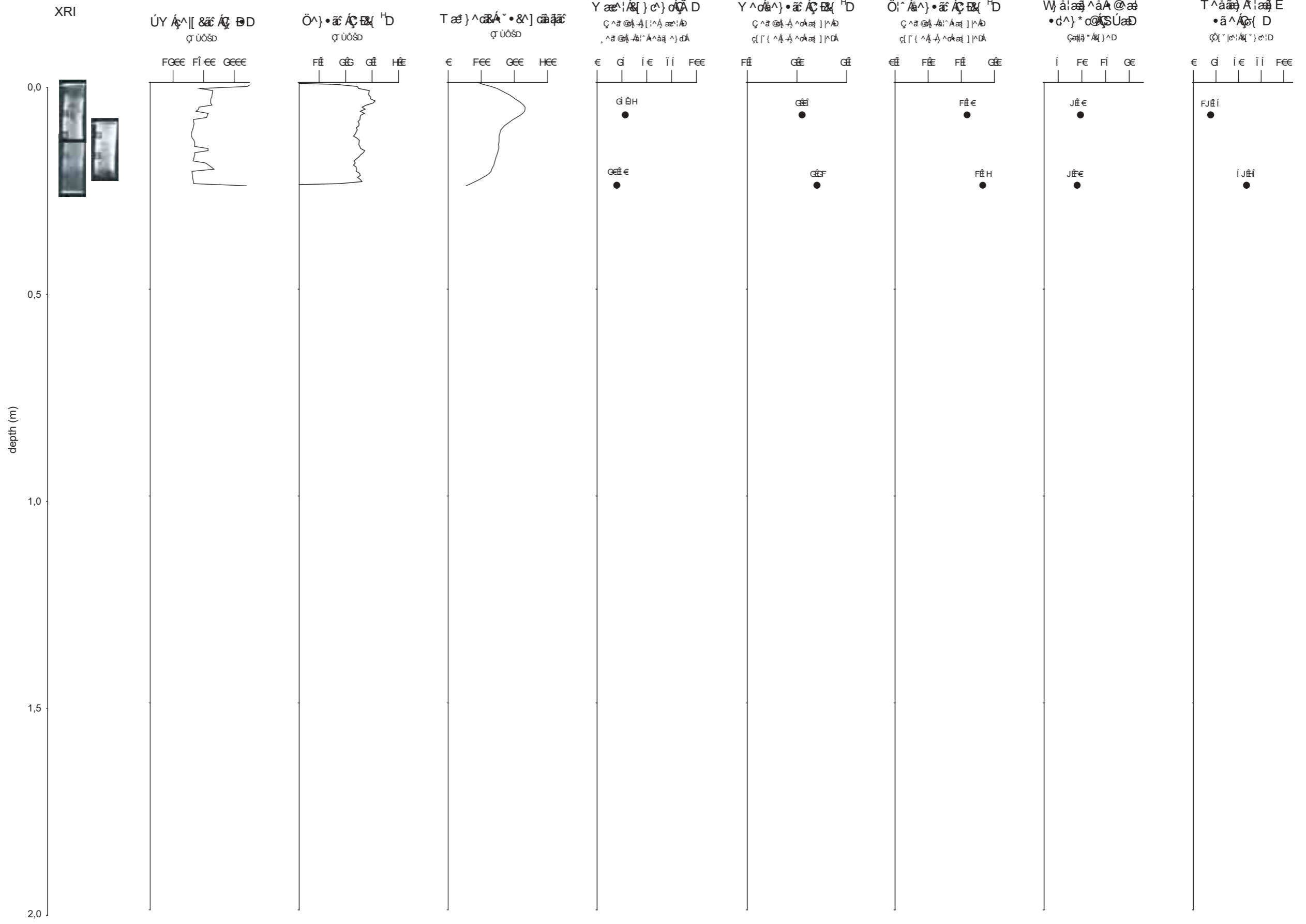
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Lithology



S3A-4

Lithology

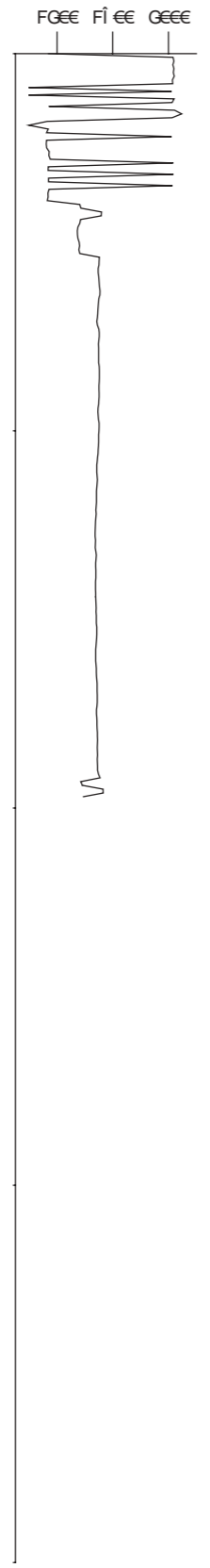
XRI

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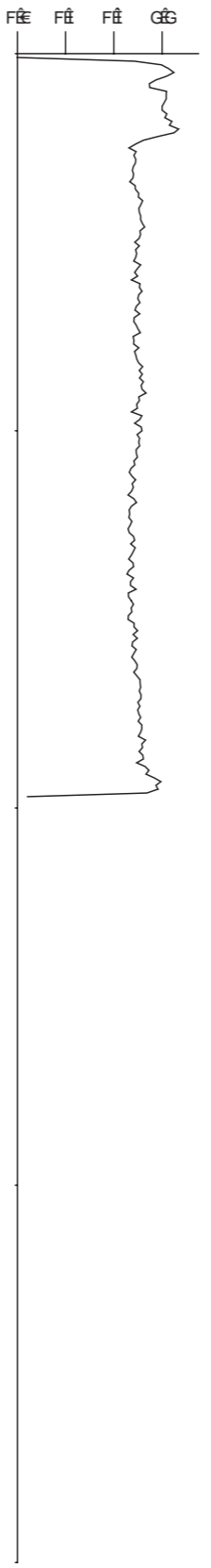
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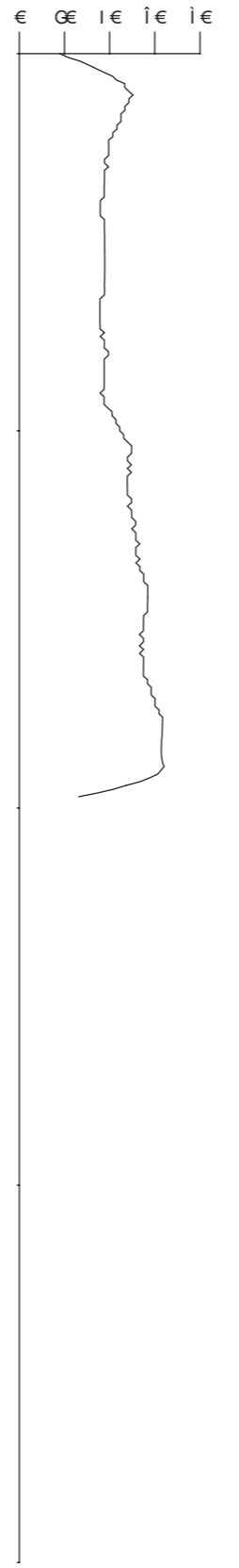
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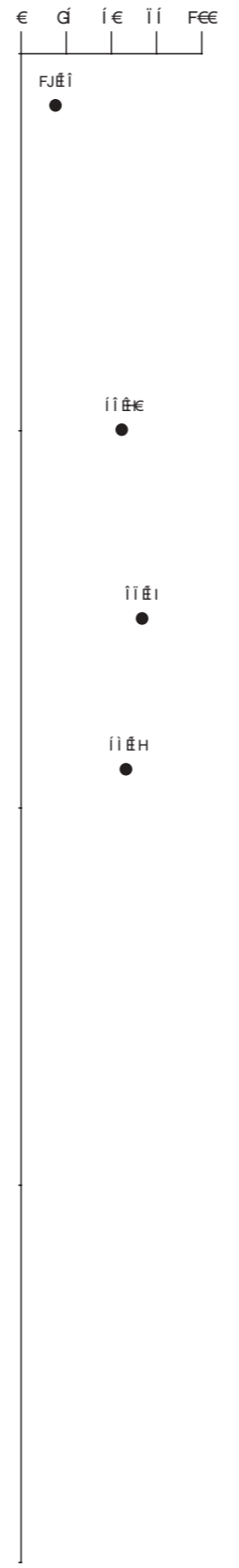
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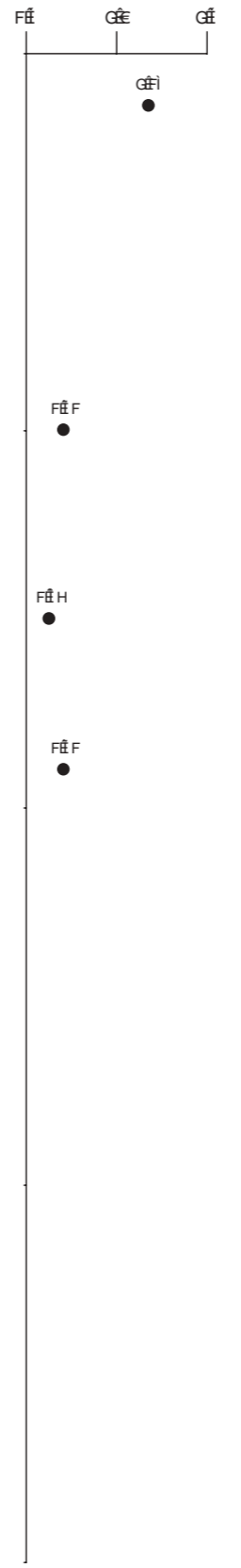
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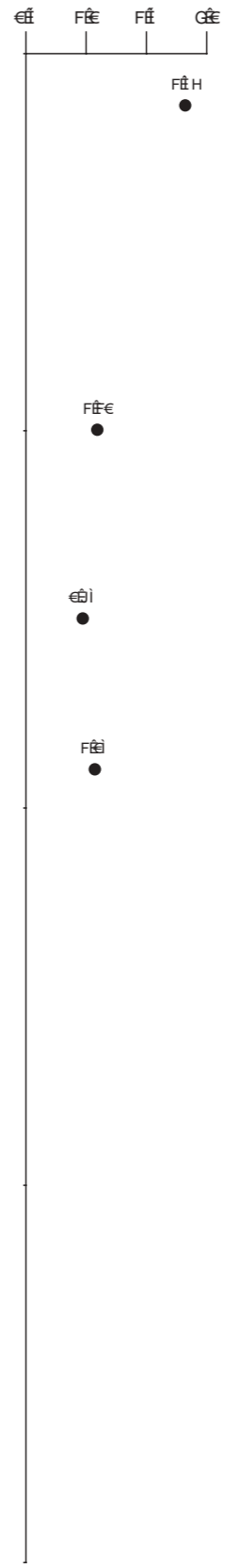
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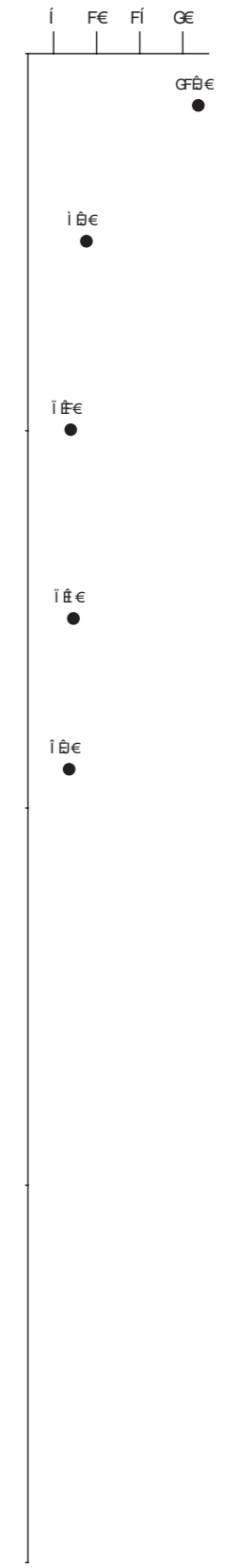
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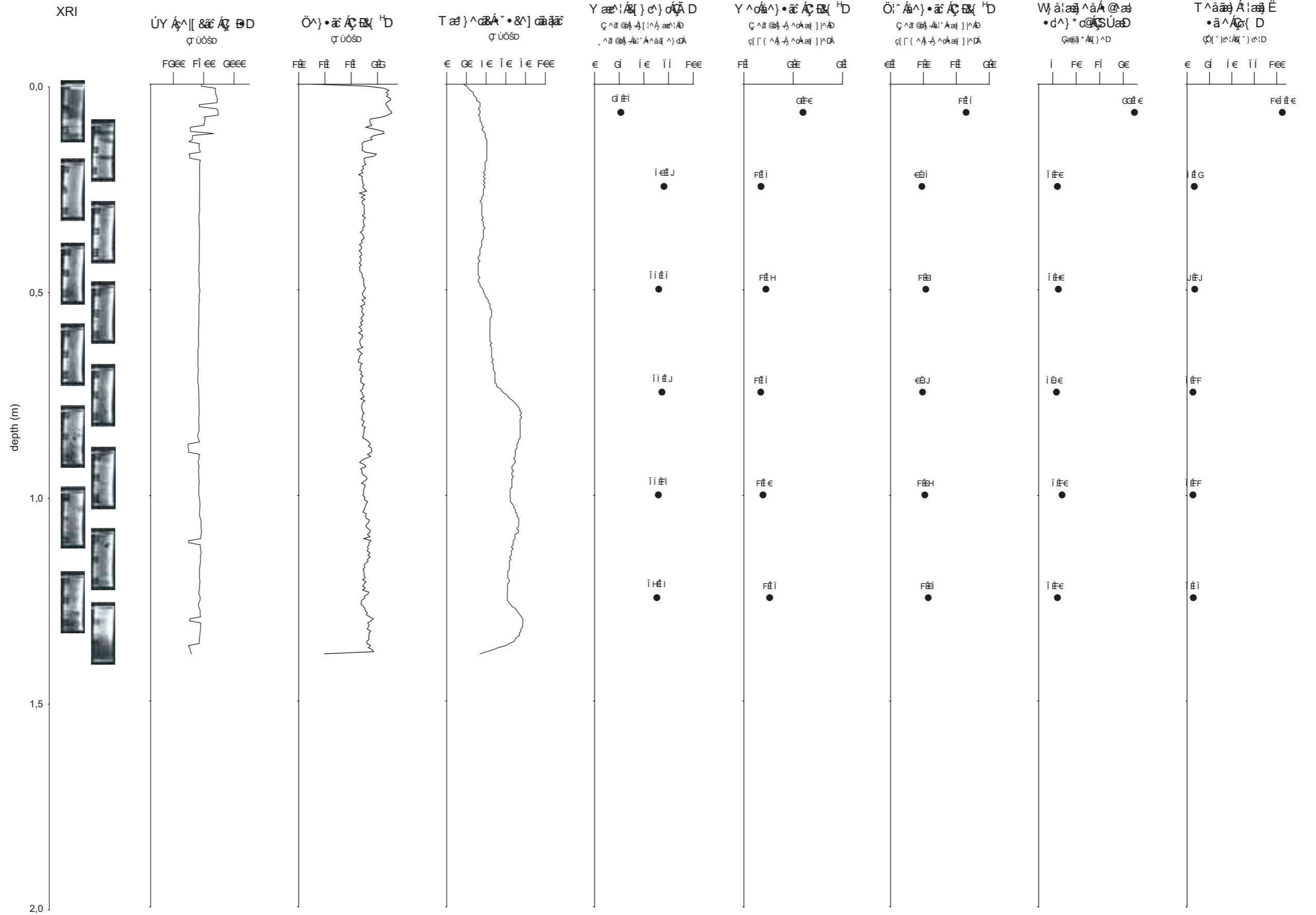
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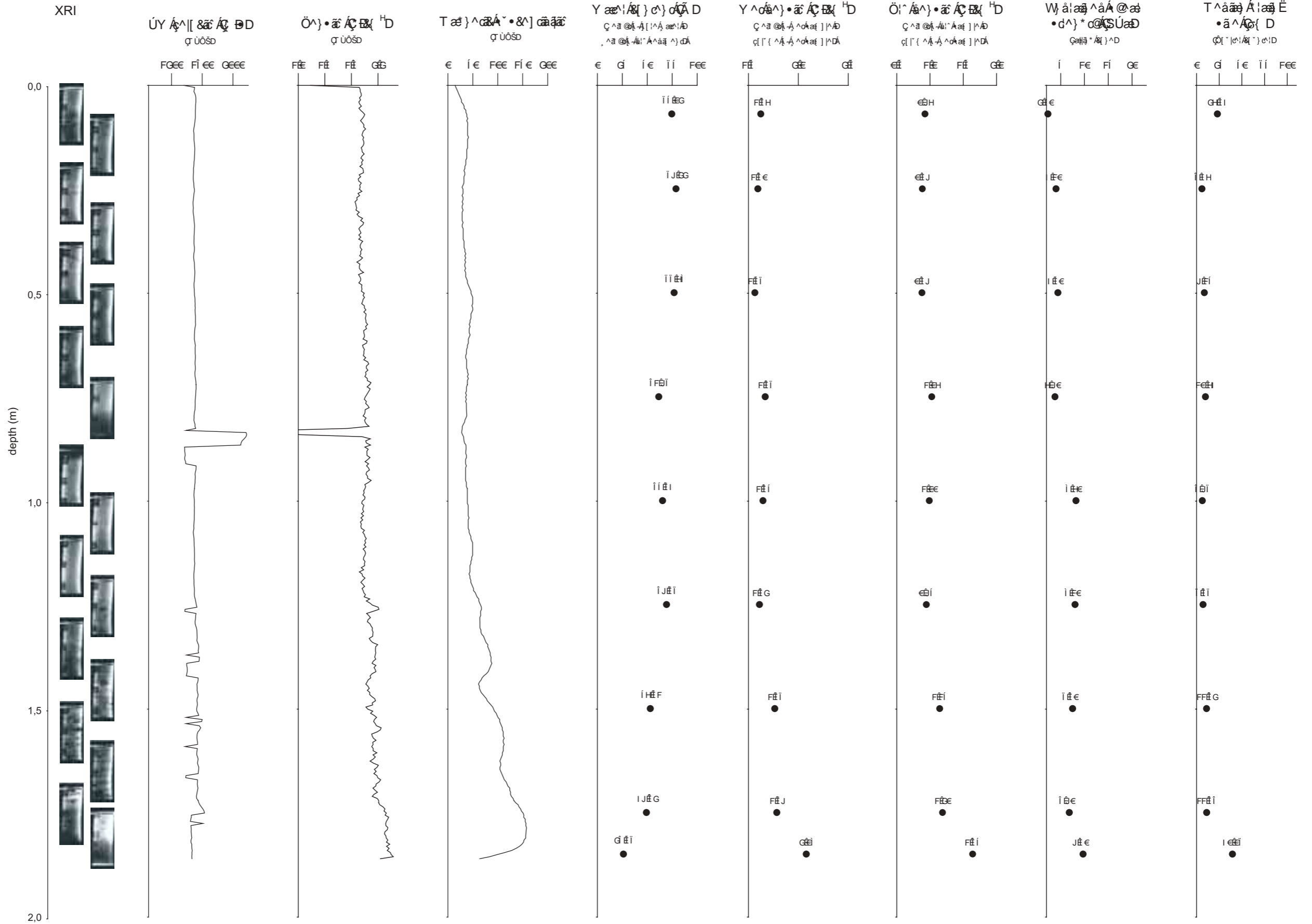
Lithology



Lithology

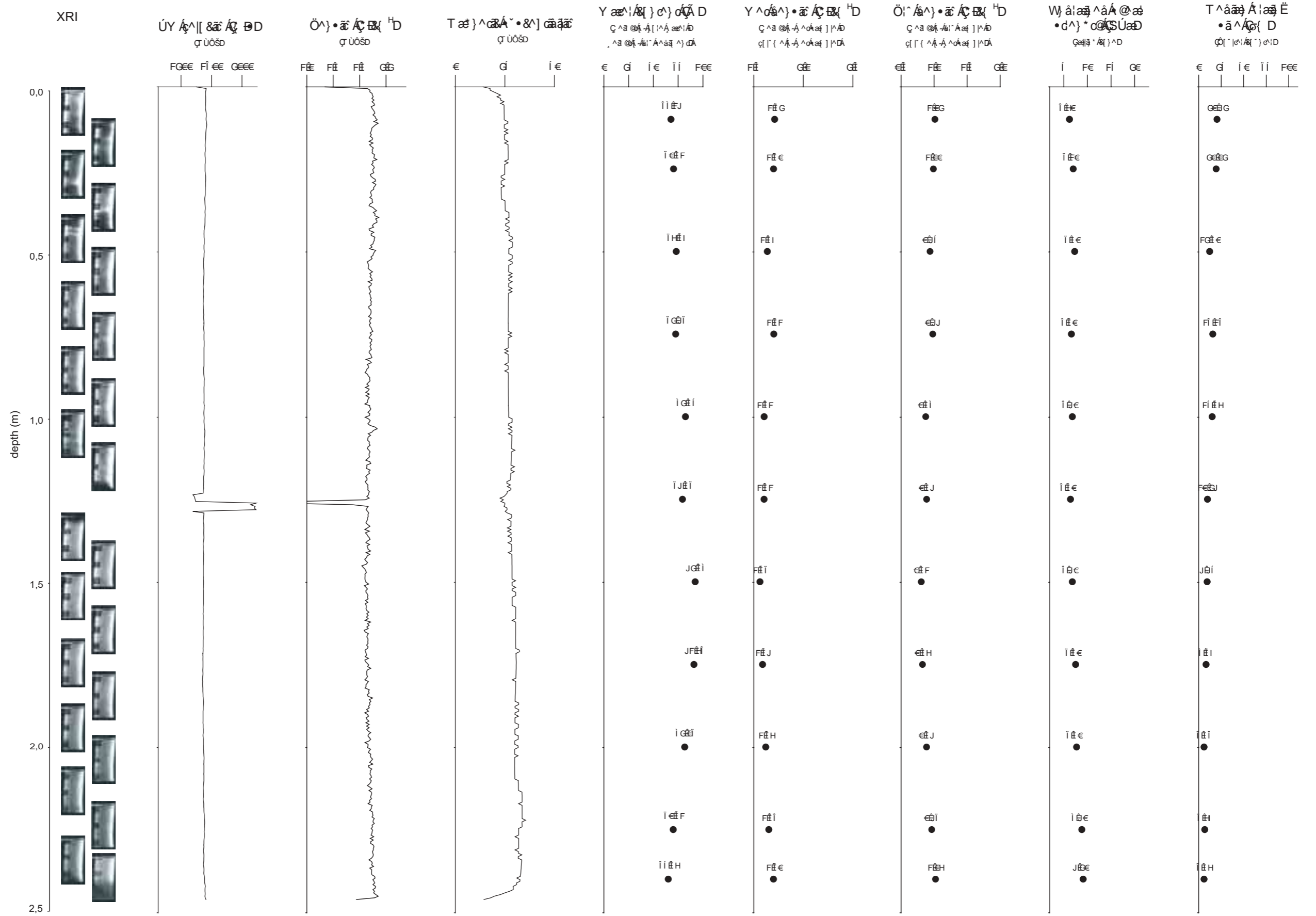
XRI

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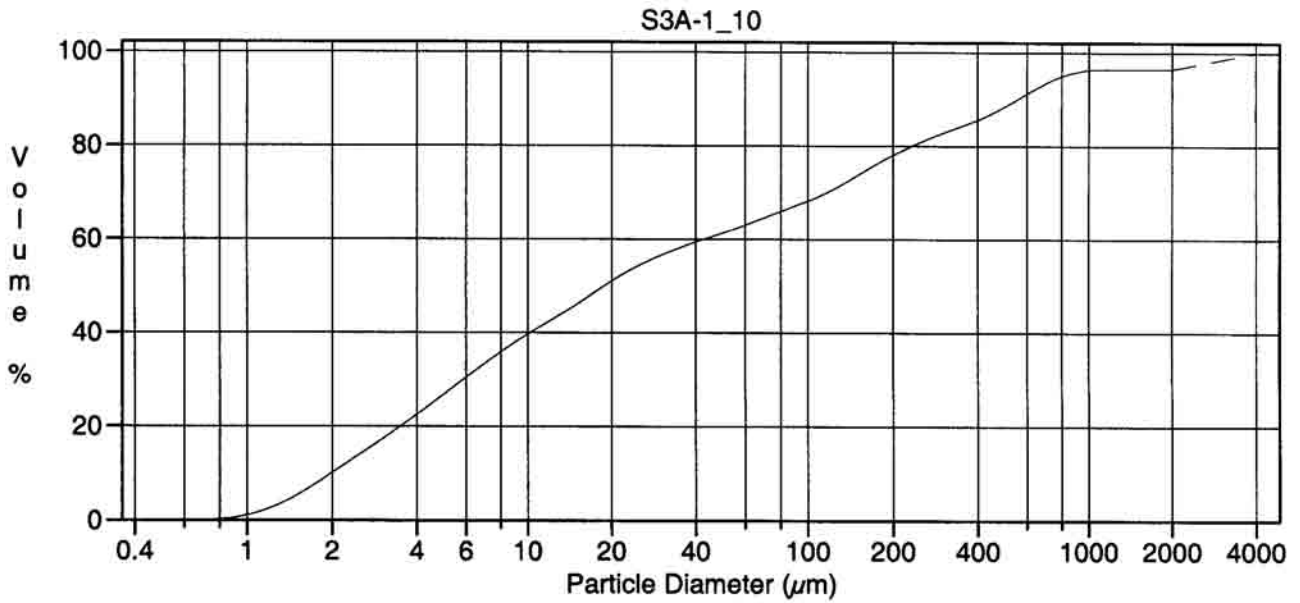
Lithology

XRI



APPENDIX 2

Cumulative grain-size distribution plots and statistical characteristics of individual samples. Note that sample IDs show the core numbers and subsampling depths, i.e. sample S3A-1_10 stands for the subsample collected from 10 cm depth of core S3A-1.



Volume Statistics (Arithmetic) 22106a.\$02

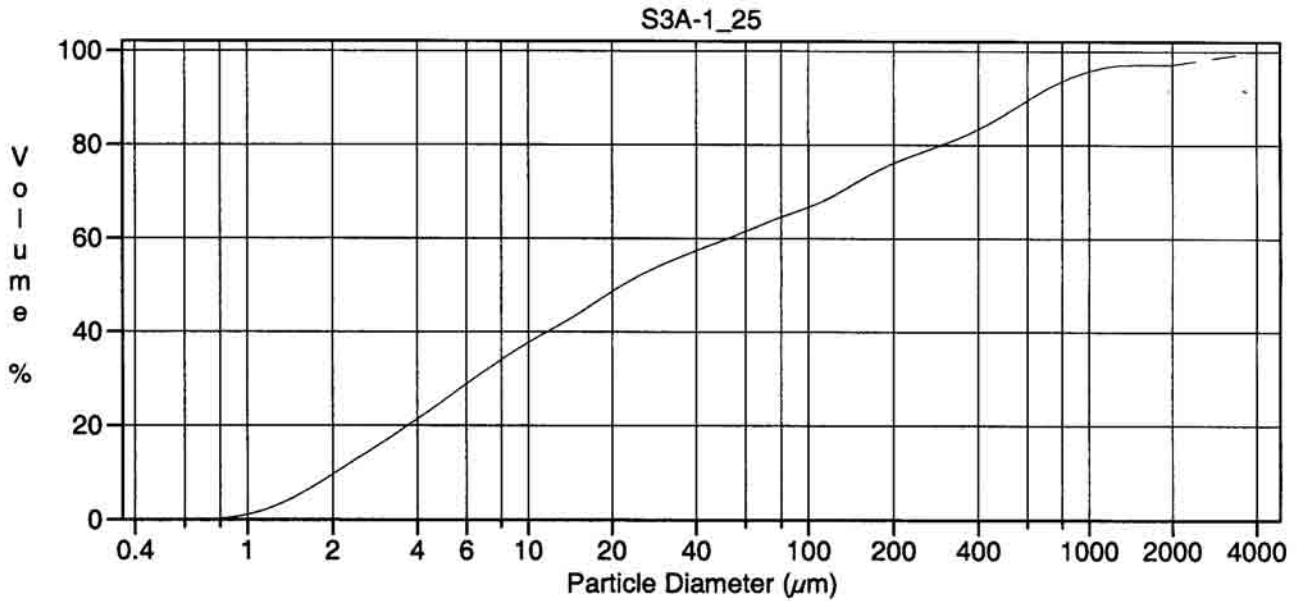
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	213.2 µm	95% Conf. Limits:	0-1261 µm
Median:	18.81 µm	S.D.:	534.7 µm
D(3,2):	6.207 µm	Variance:	285908 µm ²
Mean/Median Ratio:	11.33	C.V.:	251%
Mode:	2828 µm	Skewness:	4.097 Right skewed
d ₁₀ :	1.988 µm	Kurtosis:	16.95 Leptokurtic
d ₅₀ :	18.81 µm		
d ₉₀ :	554.5 µm		
Specific Surf. Area	9666 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.988	4.553	42.63	161.9	554.5

22106a.\$02

Particle Diameter µm	Volume %
1.000	8.98
2.000	16.7
5.000	12.8
10.00	6.41
15.00	4.92
20.00	3.34
25.00	7.01
50.00	1.67
60.00	0.49
63.00	1.09
70.00	2.53
90.00	3.82
125.0	9.85
250.0	7.63
500.0	7.87
1000	3.70



Volume Statistics (Arithmetic) 22107a.\$02

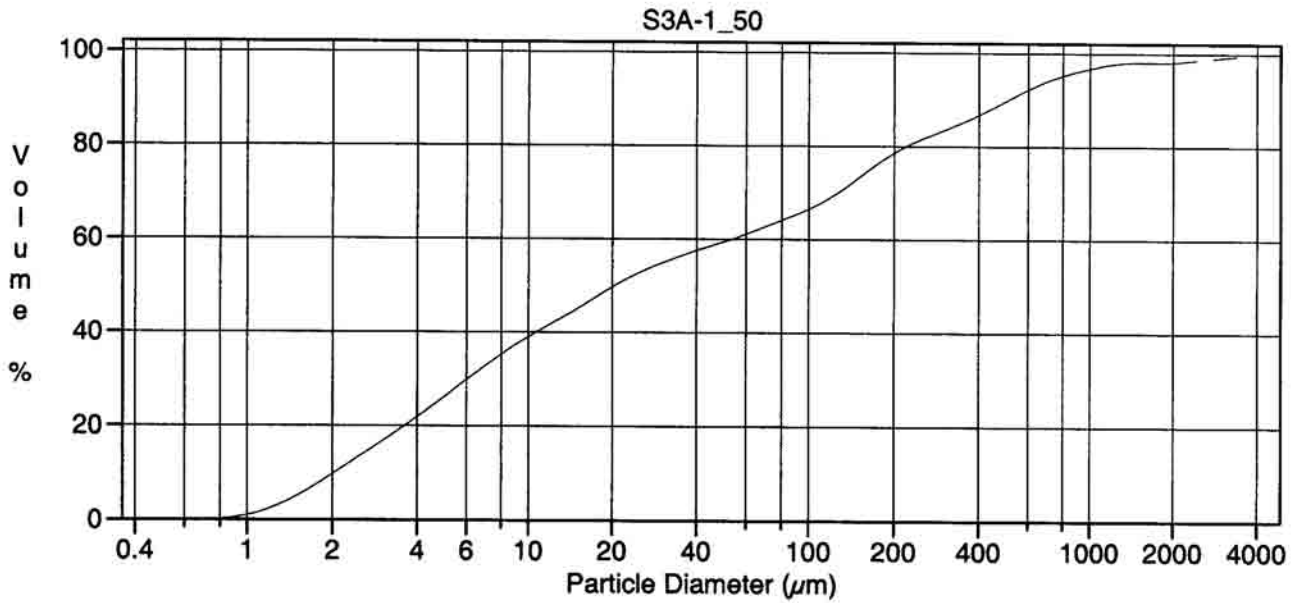
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	220.9 µm	95% Conf. Limits:	0-1217 µm
Median:	21.75 µm	S.D.:	508.4 µm
D(3,2):	6.495 µm	Variance:	258502 µm ²
Mean/Median Ratio:	10.16	C.V.:	230%
Mode:	2828 µm	Skewness:	3.980 Right skewed
d ₁₀ :	2.041 µm	Kurtosis:	17.00 Leptokurtic
d ₅₀ :	21.75 µm		
d ₉₀ :	619.1 µm		
Specific Surf. Area	9239 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.041	4.884	51.95	183.0	619.1

22107a.\$02

Particle Diameter µm	Volume %
1.000	8.58
2.000	15.8
5.000	12.2
10.00	6.15
15.00	4.84
20.00	3.39
25.00	7.56
50.00	1.91
60.00	0.54
63.00	1.14
70.00	2.47
90.00	3.76
125.0	8.93
250.0	8.22
500.0	9.16
1000	4.26



Volume Statistics (Arithmetic)

22108a.\$02

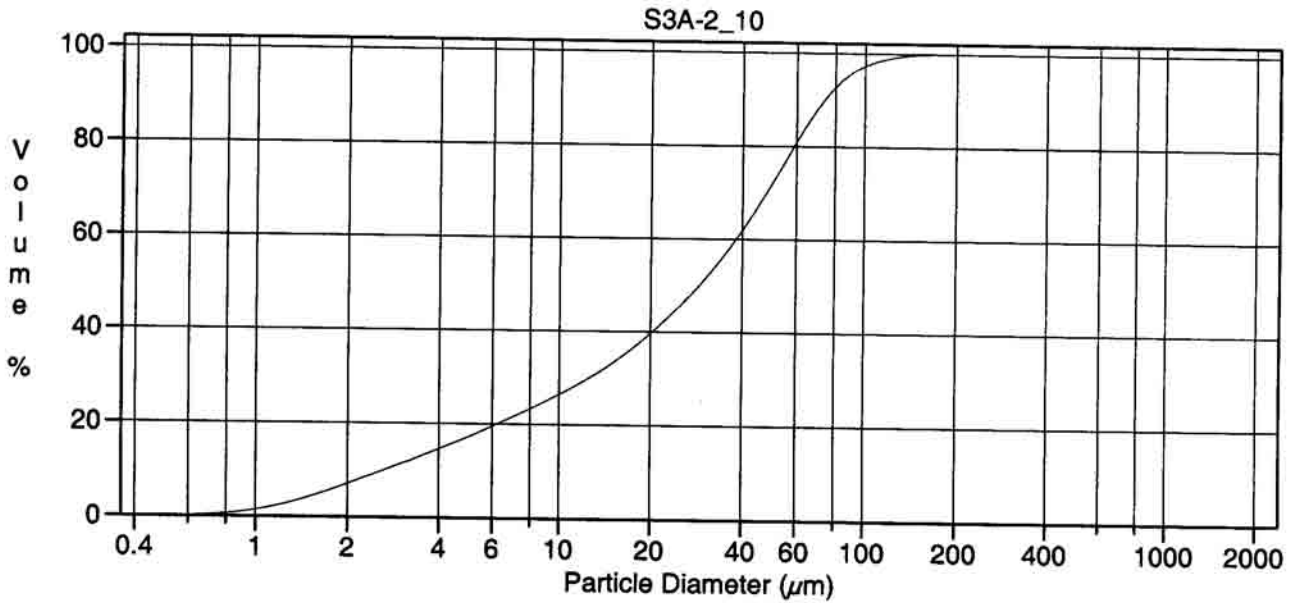
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	182.3 µm	95% Conf. Limits:	0-1024 µm
Median:	20.32 µm	S.D.:	429.4 µm
D(3,2):	6.387 µm	Variance:	184405 µm ²
Mean/Median Ratio:	8.973	C.V.:	236%
Mode:	153.8 µm	Skewness:	4.625 Right skewed
d ₁₀ :	2.027 µm	Kurtosis:	24.42 Leptokurtic
d ₅₀ :	20.32 µm		
d ₉₀ :	509.9 µm		
Specific Surf. Area	9394 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.027	4.705	53.36	163.7	509.9

22108a.\$02

Particle Diameter µm	Volume %
1.000	8.75
2.000	16.4
5.000	12.8
10.00	6.09
15.00	4.65
20.00	3.10
25.00	6.59
50.00	1.67
60.00	0.49
63.00	1.10
70.00	2.65
90.00	4.45
125.0	11.7
250.0	8.26
500.0	7.02
1000	3.25



Volume Statistics (Arithmetic)

22126#.\$02

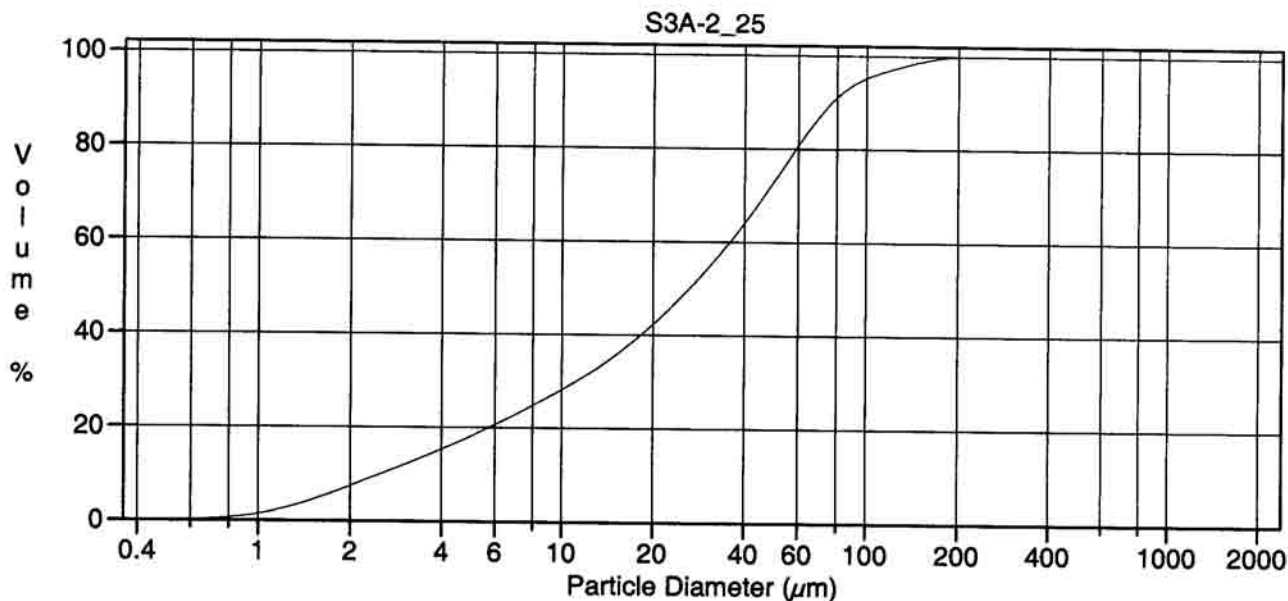
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	34.50 µm	95% Conf. Limits:	0-91.27 µm	
Median:	28.91 µm	S.D.:	28.96 µm	
D(3,2):	7.872 µm	Variance:	838.9 µm ²	
Mean/Median Ratio:	1.193	C.V.:	84.0%	
Mode:	55.14 µm	Skewness:	0.969 Right skewed	
d ₁₀ :	2.622 µm	Kurtosis:	0.838 Leptokurtic	
d ₅₀ :	28.91 µm			
d ₉₀ :	74.00 µm			
Specific Surf. Area	7622 cm ² /ml			

% <	10	25	60	75	90
Size µm	2.622	9.025	38.19	53.23	74.00

22126#.\$02

Particle Diameter µm	Volume %
1.000	5.73
2.000	10.1
5.000	9.21
10.00	6.77
15.00	6.41
20.00	5.96
25.00	26.3
50.00	8.90
60.00	2.39
63.00	4.67
70.00	7.66
90.00	3.58
125.0	0.85
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic)

22127.\$02

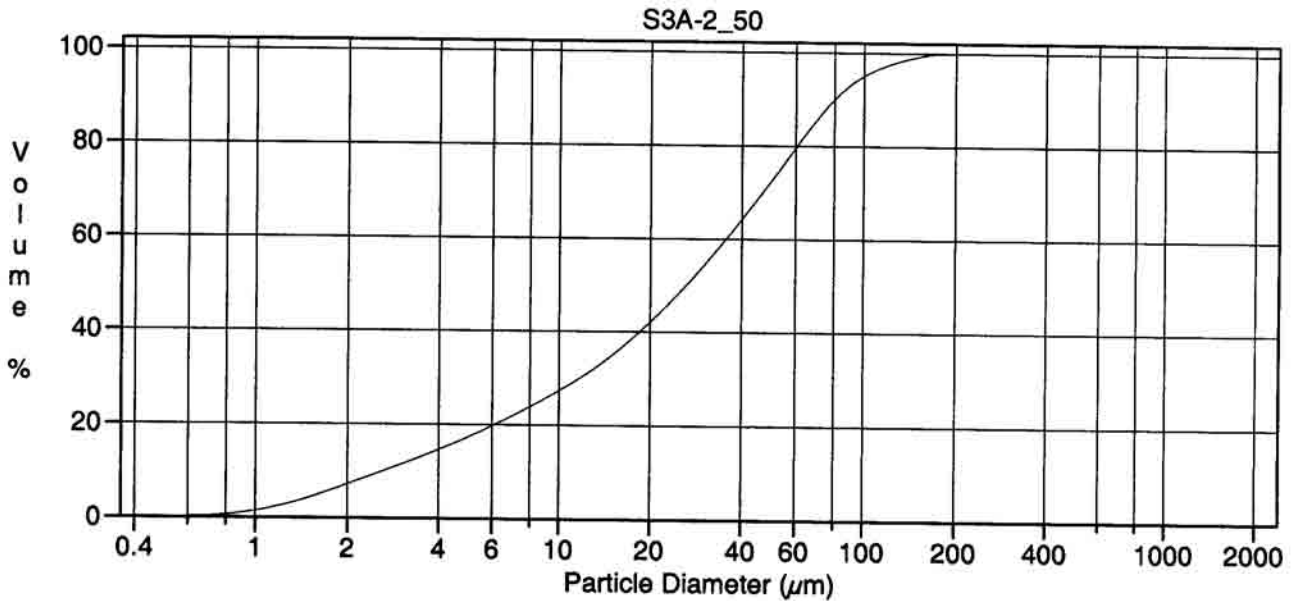
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	35.10 µm	95% Conf. Limits:	0-100.6 µm	
Median:	26.39 µm	S.D.:	33.42 µm	
D(3,2):	7.562 µm	Variance:	1117 µm ²	
Mean/Median Ratio:	1.330	C.V.:	95.2%	
Mode:	55.14 µm	Skewness:	1.526 Right skewed	
d ₁₀ :	2.512 µm	Kurtosis:	2.971 Leptokurtic	
d ₅₀ :	26.39 µm			
d ₉₀ :	77.21 µm			
Specific Surf. Area	7934 cm ² /ml			

% <	10	25	60	75	90
Size µm	2.512	8.116	35.82	52.41	77.21

22127.\$02

Particle Diameter µm	Volume %
1.000	6.05
2.000	10.7
5.000	10.1
10.00	7.31
15.00	6.78
20.00	6.11
25.00	24.6
50.00	7.70
60.00	2.07
63.00	4.05
70.00	6.78
90.00	3.82
125.0	2.59
250.0	0.00034
500.0	0
1000	0



Volume Statistics (Arithmetic)

22128.\$02

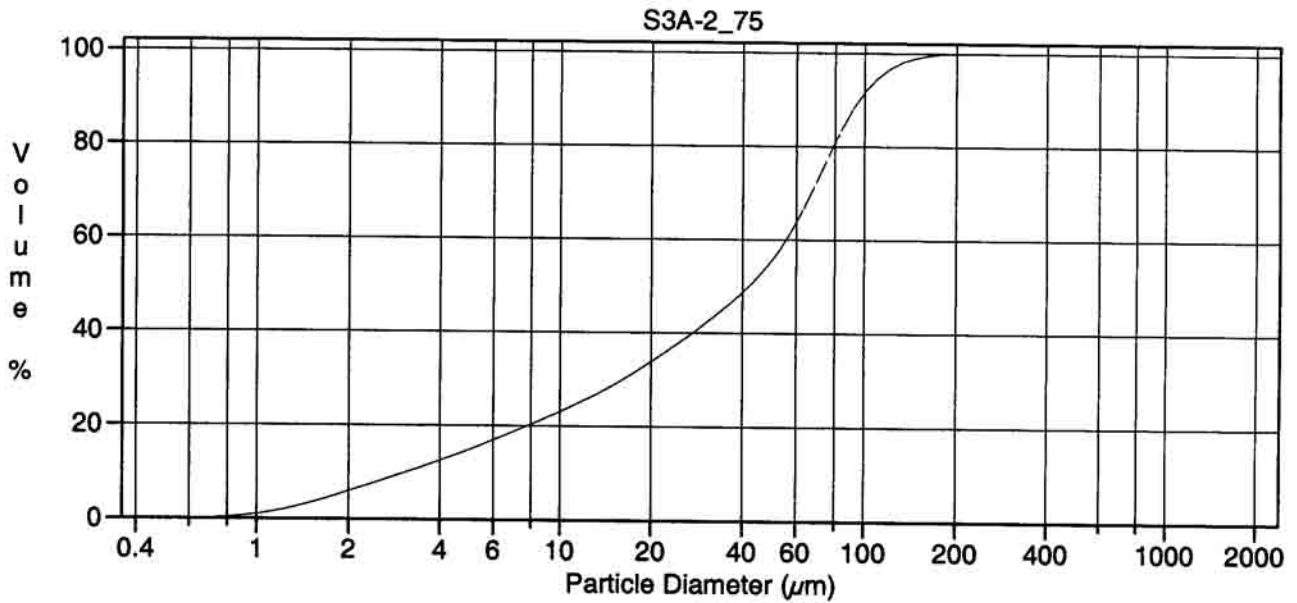
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	35.37 µm	95% Conf. Limits:	0-99.81 µm
Median:	26.28 µm	S.D.:	32.88 µm
D(3,2):	7.716 µm	Variance:	1081 µm ²
Mean/Median Ratio:	1.346	C.V.:	93.0%
Mode:	60.52 µm	Skewness:	1.326 Right skewed
d ₁₀ :	2.607 µm	Kurtosis:	1.848 Leptokurtic
d ₅₀ :	26.28 µm		
d ₉₀ :	80.23 µm		
Specific Surf. Area	7776 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.607	8.620	35.51	53.36	80.23

22128.\$02

Particle Diameter µm	Volume %
1.000	5.75
2.000	10.2
5.000	9.96
10.00	7.60
15.00	7.13
20.00	6.40
25.00	24.0
50.00	7.11
60.00	1.96
63.00	4.00
70.00	7.45
90.00	4.81
125.0	2.19
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic) 22129.\$02

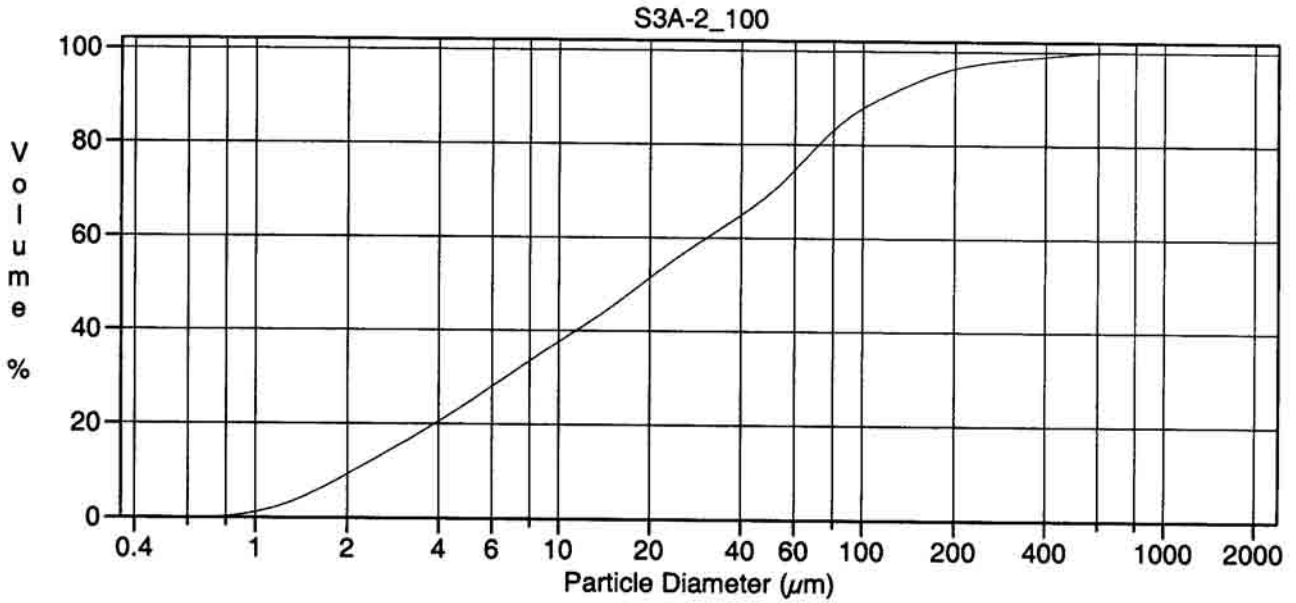
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	46.27 µm	95% Conf. Limits:	0-119.3 µm
Median:	41.89 µm	S.D.:	37.26 µm
D(3,2):	9.282 µm	Variance:	1389 µm ²
Mean/Median Ratio:	1.105	C.V.:	80.5%
Mode:	72.95 µm	Skewness:	0.678 Right skewed
d ₁₀ :	3.071 µm	Kurtosis:	-0.062 Platykurtic
d ₅₀ :	41.89 µm		
d ₉₀ :	96.38 µm		
Specific Surf. Area	6464 cm ² /ml		

% <	10	25	60	75	90
Size µm	3.071	11.56	55.50	72.83	96.38

22129.\$02

Particle Diameter µm	Volume %
1.000	4.98
2.000	8.93
5.000	8.18
10.00	5.68
15.00	4.98
20.00	4.30
25.00	17.6
50.00	8.16
60.00	2.64
63.00	6.18
70.00	14.3
90.00	10.2
125.0	2.84
250.0	0.000099
500.0	0
1000	0



Volume Statistics (Arithmetic)

22130.\$02

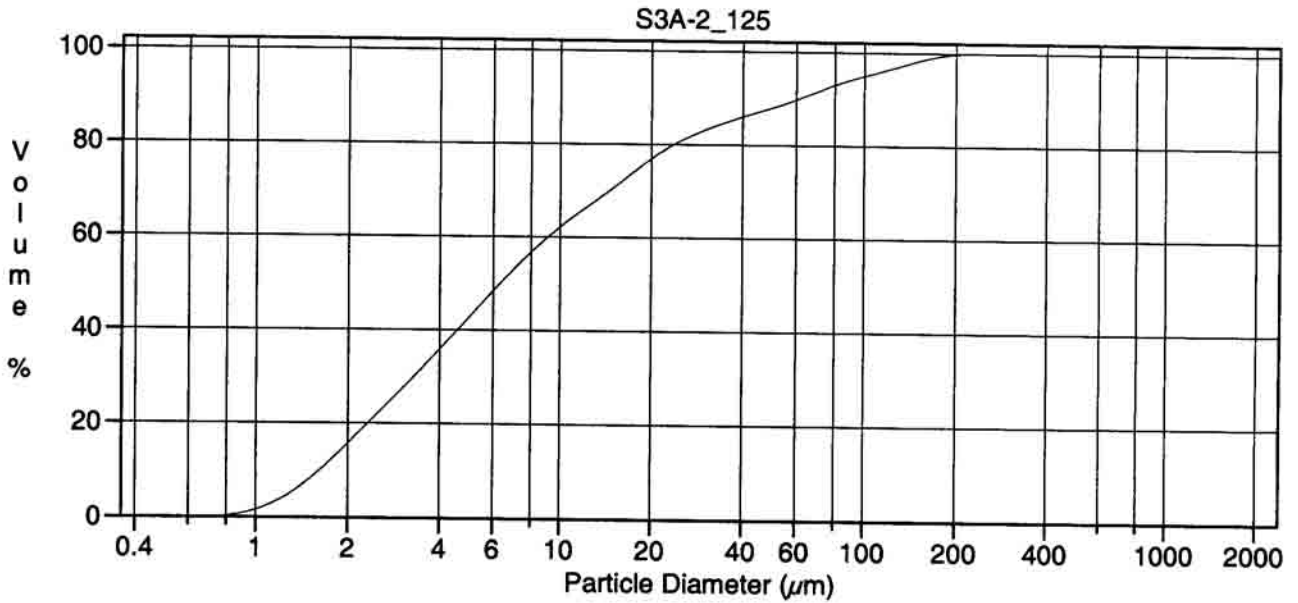
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	46.25 µm	95% Conf. Limits:	0-188.1 µm
Median:	18.75 µm	S.D.:	72.37 µm
D(3,2):	6.381 µm	Variance:	5238 µm ²
Mean/Median Ratio:	2.466	C.V.:	156%
Mode:	66.44 µm	Skewness:	3.655 Right skewed
d ₁₀ :	2.090 µm	Kurtosis:	18.20 Leptokurtic
d ₅₀ :	18.75 µm		
d ₉₀ :	115.1 µm		
Specific Surf. Area	9403 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.090	5.120	30.80	60.78	115.1

22130.\$02

Particle Diameter µm	Volume %
1.000	8.15
2.000	15.2
5.000	13.1
10.00	7.63
15.00	6.14
20.00	4.65
25.00	13.7
50.00	4.93
60.00	1.48
63.00	3.20
70.00	6.52
90.00	5.33
125.0	6.47
250.0	1.96
500.0	0.42
1000	0



Volume Statistics (Arithmetic)

22131.\$02

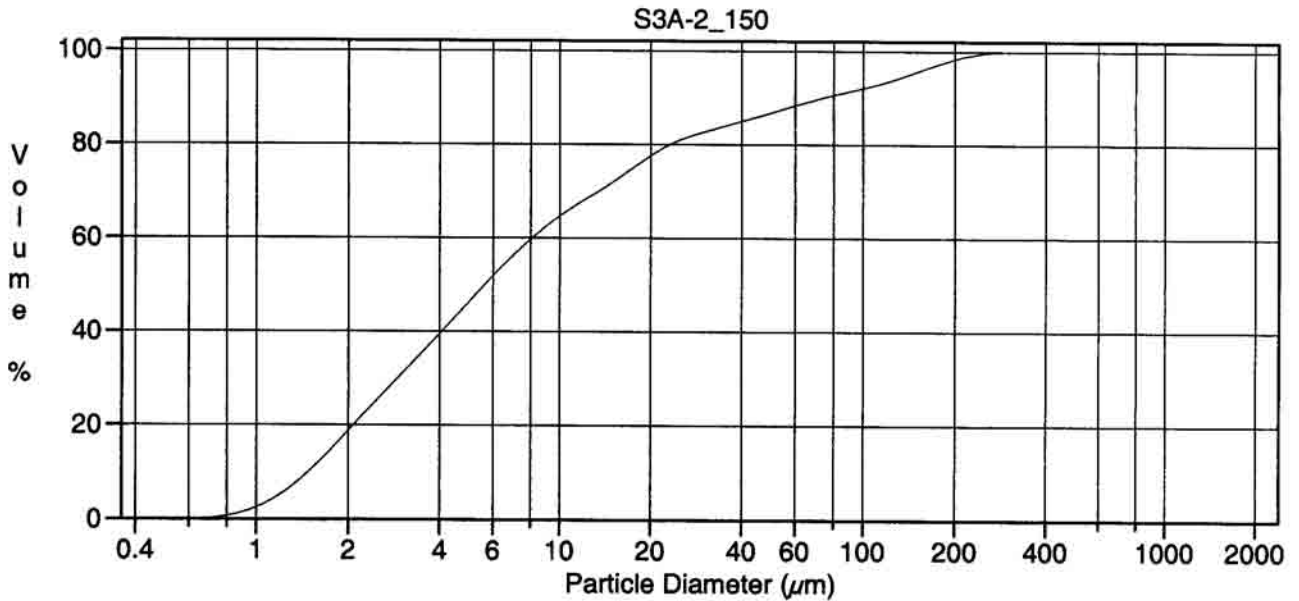
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	20.05 µm	95% Conf. Limits:	0-86.79 µm	
Median:	6.330 µm	S.D.:	34.05 µm	
D(3,2):	4.051 µm	Variance:	1160 µm ²	
Mean/Median Ratio:	3.167	C.V.:	170%	
Mode:	4.878 µm	Skewness:	2.881 Right skewed	
d ₁₀ :	1.614 µm	Kurtosis:	8.669 Leptokurtic	
d ₅₀ :	6.330 µm			
d ₉₀ :	61.03 µm			
Specific Surf. Area	14812 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.614	2.768	9.132	18.31	61.03

22131.\$02

Particle Diameter µm	Volume %
1.000	14.1
2.000	27.0
5.000	19.4
10.00	8.51
15.00	6.21
20.00	3.93
25.00	7.24
50.00	1.78
60.00	0.54
63.00	1.20
70.00	2.57
90.00	2.63
125.0	3.24
250.0	0.0043
500.0	0
1000	0



Volume Statistics (Arithmetic)

22132#.\$02

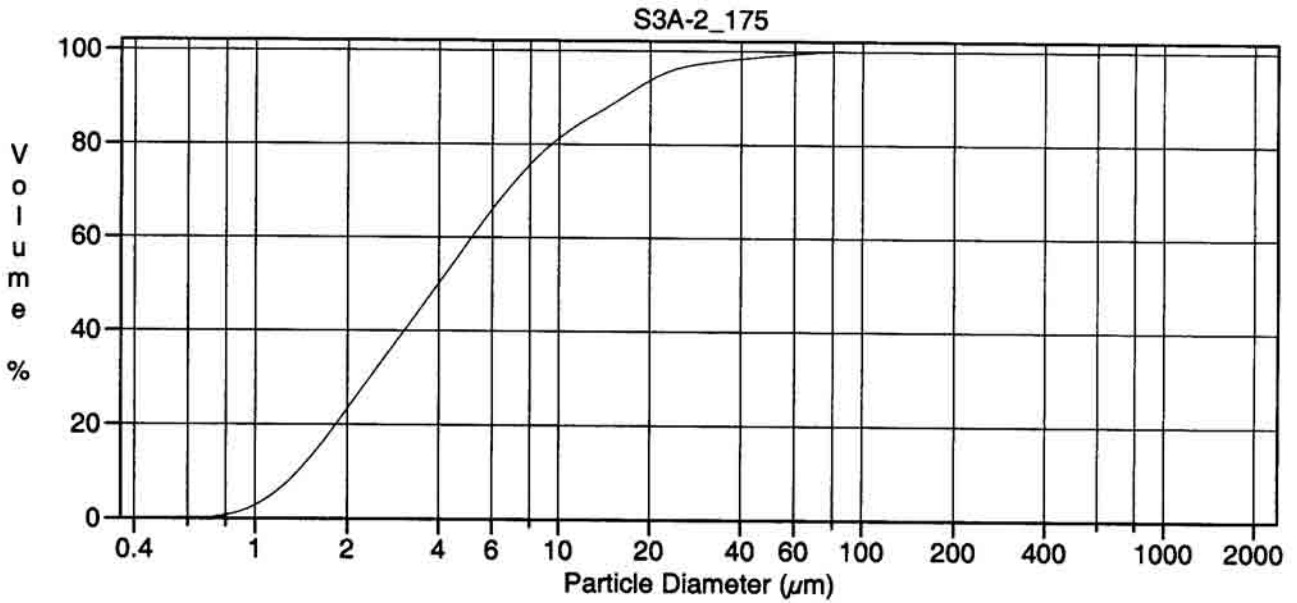
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	23.89 µm	95% Conf. Limits:	0-114.2 µm
Median:	5.640 µm	S.D.:	46.09 µm
D(3,2):	3.671 µm	Variance:	2124 µm ²
Mean/Median Ratio:	4.236	C.V.:	193%
Mode:	4.878 µm	Skewness:	2.958 Right skewed
d ₁₀ :	1.477 µm	Kurtosis:	8.753 Leptokurtic
d ₅₀ :	5.640 µm		
d ₉₀ :	73.57 µm		
Specific Surf. Area	16343 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.477	2.453	8.101	17.55	73.57

22132#.\$02

Particle Diameter µm	Volume %
1.000	16.3
2.000	27.5
5.000	18.4
10.00	7.29
15.00	5.56
20.00	3.41
25.00	5.88
50.00	1.55
60.00	0.42
63.00	0.86
70.00	1.73
90.00	2.47
125.0	5.80
250.0	0.38
500.0	0
1000	0



Volume Statistics (Arithmetic)

22133.\$02

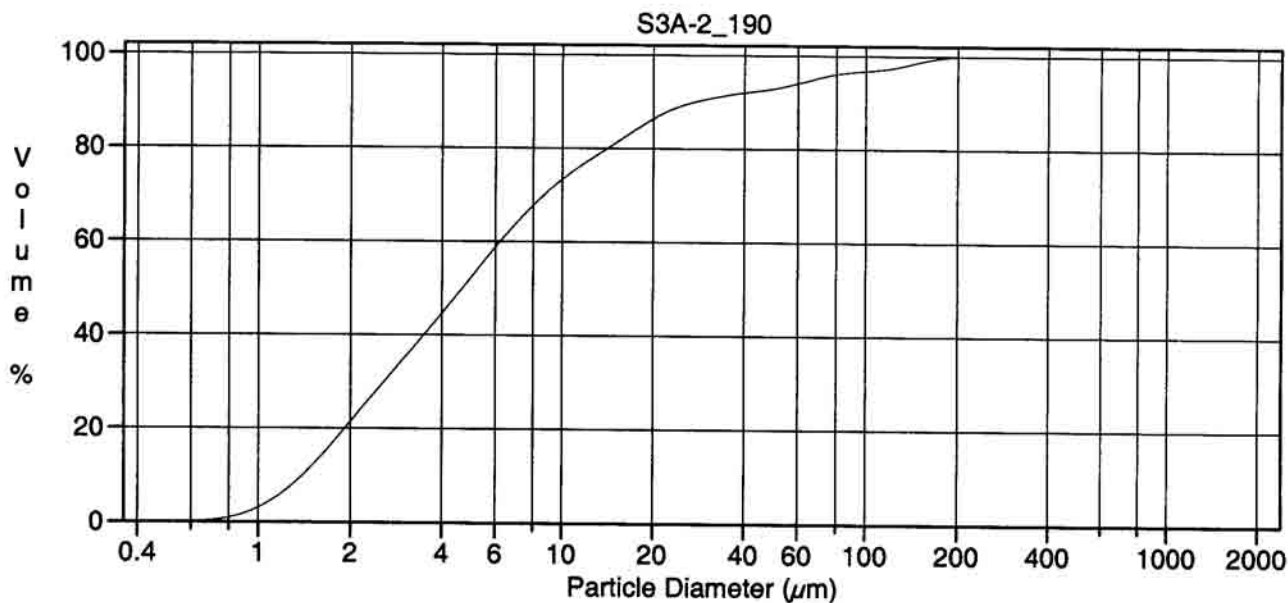
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	6.956 µm	95% Conf. Limits:	0-24.51 µm
Median:	3.984 µm	S.D.:	8.955 µm
D(3,2):	2.985 µm	Variance:	80.20 µm ²
Mean/Median Ratio:	1.746	C.V.:	129%
Mode:	4.444 µm	Skewness:	3.759 Right skewed
d ₁₀ :	1.377 µm	Kurtosis:	19.05 Leptokurtic
d ₅₀ :	3.984 µm		
d ₉₀ :	16.21 µm		
Specific Surf. Area	20098 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.377	2.084	5.135	7.849	16.21

22133.\$02

Particle Diameter µm	Volume %
1.000	20.5
2.000	35.5
5.000	22.4
10.00	7.29
15.00	5.09
20.00	2.67
25.00	2.58
50.00	0.44
60.00	0.13
63.00	0.25
70.00	0.22
90.00	0.0050
125.0	0
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic)

22134.\$02

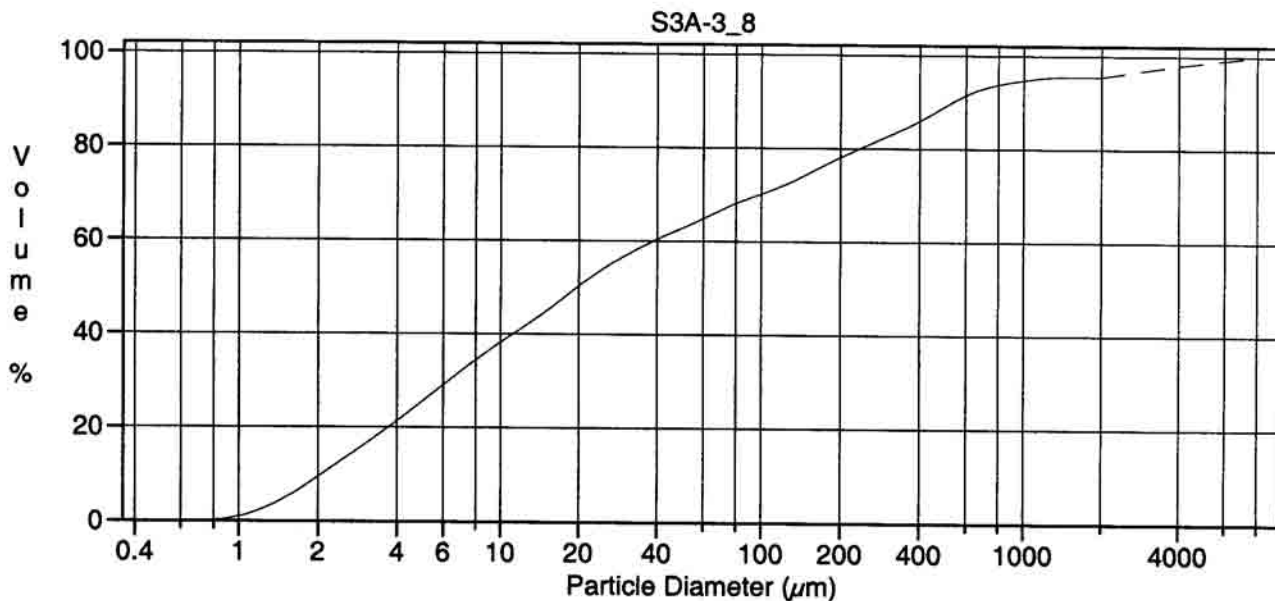
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	13.86 µm	95% Conf. Limits:	0-69.02 µm
Median:	4.664 µm	S.D.:	28.14 µm
D(3,2):	3.245 µm	Variance:	792.0 µm ²
Mean/Median Ratio:	2.972	C.V.:	203%
Mode:	4.878 µm	Skewness:	3.912 Right skewed
d ₁₀ :	1.394 µm	Kurtosis:	16.36 Leptokurtic
d ₅₀ :	4.664 µm		
d ₉₀ :	27.36 µm		
Specific Surf. Area	18491 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.394	2.219	6.229	10.80	27.36

22134.\$02

Particle Diameter µm	Volume %
1.000	18.4
2.000	30.9
5.000	20.9
10.00	7.75
15.00	5.26
20.00	2.91
25.00	3.67
50.00	1.12
60.00	0.37
63.00	0.82
70.00	1.27
90.00	1.05
125.0	2.45
250.0	0.00034
500.0	0
1000	0



Volume Statistics (Arithmetic)

22109a.\$02

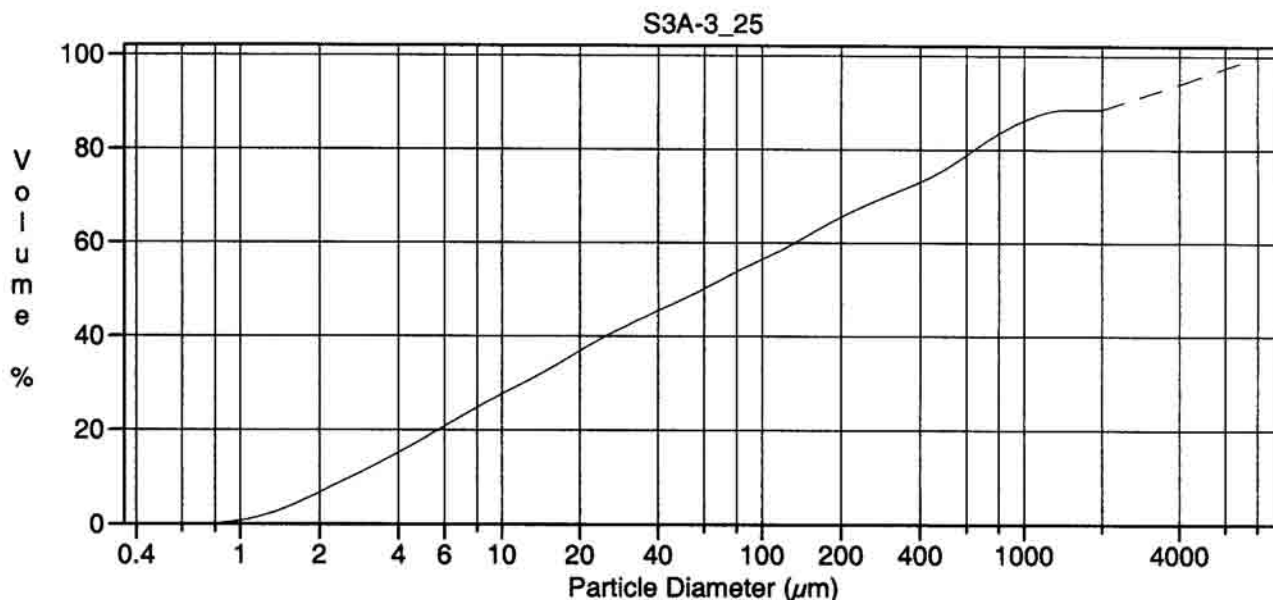
Calculations from 0.375 μm to 8000 μm

Volume	100.0%			
Mean:	288.6 μm	95% Conf. Limits:	0-2036 μm	
Median:	19.65 μm	S.D.:	891.5 μm	
D(3,2):	6.452 μm	Variance:	794771 μm^2	
Mean/Median Ratio:	14.69	C.V.:	309%	
Mode:	2828 μm	Skewness:	4.848 Right skewed	
d ₁₀ :	2.061 μm	Kurtosis:	24.43 Leptokurtic	
d ₅₀ :	19.65 μm			
d ₉₀ :	532.4 μm			
Specific Surf. Area	9299 cm^2/ml			

% <	10	25	60	75	90
Size μm	2.061	4.853	38.78	155.3	532.4

22109a.\$02

Particle Diameter μm	Volume %
1.000	8.49
2.000	16.1
5.000	12.7
10.00	6.74
15.00	5.37
20.00	3.81
25.00	8.64
50.00	2.04
60.00	0.58
63.00	1.24
70.00	2.59
90.00	3.12
125.0	8.26
250.0	8.49
500.0	5.61
1000	5.26



Volume Statistics (Arithmetic)

22110a.\$02

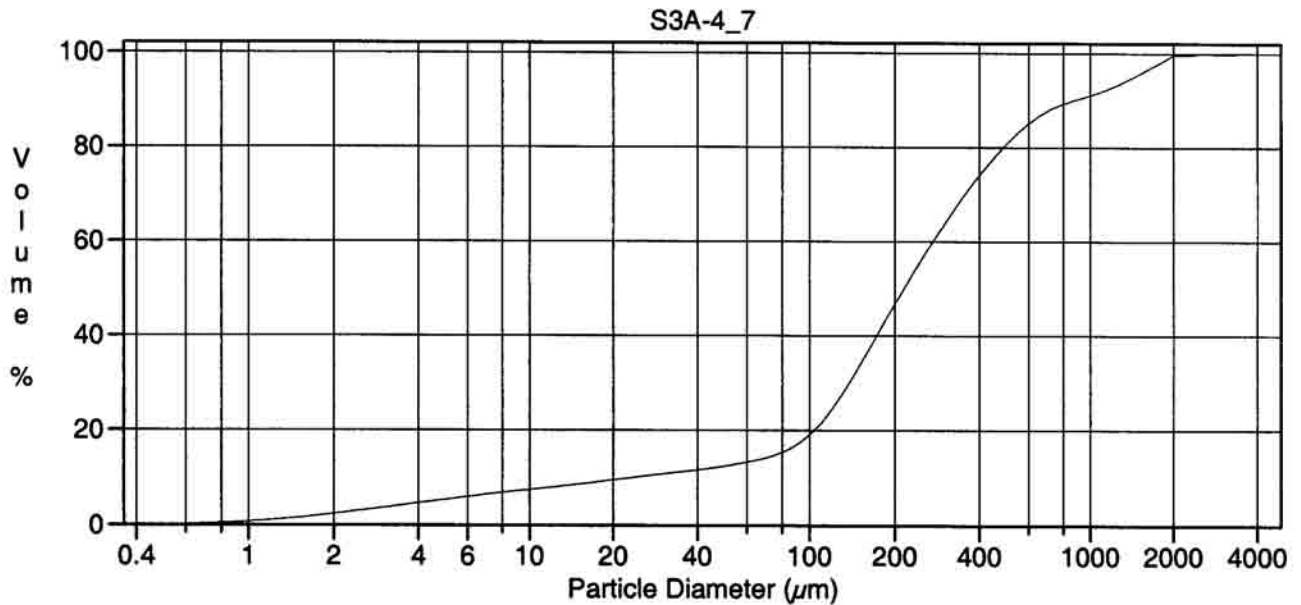
Calculations from 0.375 µm to 8000 µm

Volume	100.0%		
Mean:	650.4 µm	95% Conf. Limits:	0-3437 µm
Median:	59.36 µm	S.D.:	1422 µm
D(3,2):	8.835 µm	Variance:	2021035 µm ²
Mean/Median Ratio:	10.96	C.V.:	219%
Mode:	5657 µm	Skewness:	2.752 Right skewed
d ₁₀ :	2.624 µm	Kurtosis:	6.519 Leptokurtic
d ₅₀ :	59.36 µm		
d ₉₀ :	2506 µm		
Specific Surf. Area	6791 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.624	8.127	133.2	467.6	2506

22110a.\$02

Particle Diameter µm	Volume %
1.000	6.05
2.000	11.4
5.000	9.46
10.00	5.12
15.00	4.12
20.00	3.02
25.00	8.01
50.00	2.18
60.00	0.63
63.00	1.38
70.00	3.10
90.00	3.90
125.0	9.04
250.0	7.77
500.0	10.3
1000	13.8



Volume Statistics (Arithmetic)

22101a.\$02

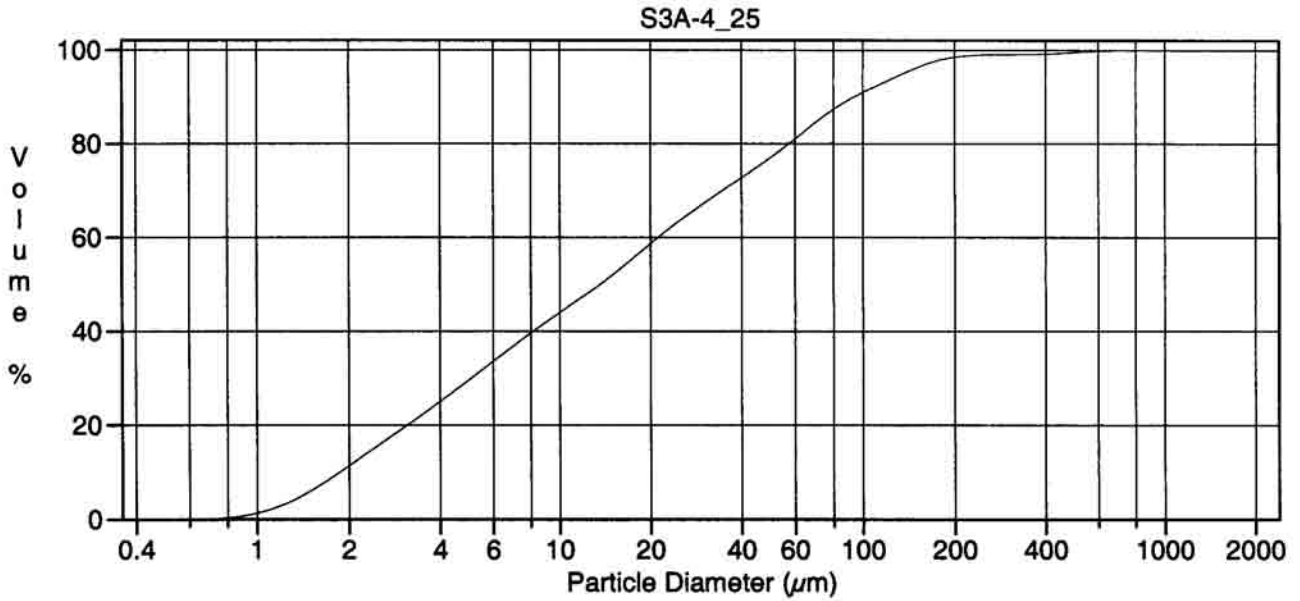
Calculations from 0.375 µm to 4000 µm

Volume	100.0%	95% Conf. Limits:	0-1202 µm
Mean:	360.8 µm	S.D.:	429.4 µm
Median:	215.9 µm	Variance:	184408 µm ²
D(3,2):	24.05 µm	C.V.:	119%
Mean/Median Ratio:	1.671	Skewness:	2.460 Right skewed
Mode:	168.8 µm	Kurtosis:	6.781 Leptokurtic
d ₁₀ :	22.83 µm		
d ₅₀ :	215.9 µm		
d ₉₀ :	866.7 µm		
Specific Surf. Area	2495 cm ² /ml		

% <	10	25	60	75	90
Size µm	22.83	121.7	273.6	411.3	866.7

22101a.\$02

Particle Diameter µm	Volume %
1.000	1.65
2.000	3.03
5.000	2.10
10.00	1.14
15.00	0.91
20.00	0.71
25.00	2.23
50.00	0.81
60.00	0.25
63.00	0.65
70.00	2.81
90.00	8.97
125.0	30.3
250.0	24.5
500.0	10.4
1000	8.90



Volume Statistics (Arithmetic)

22102#.\$02

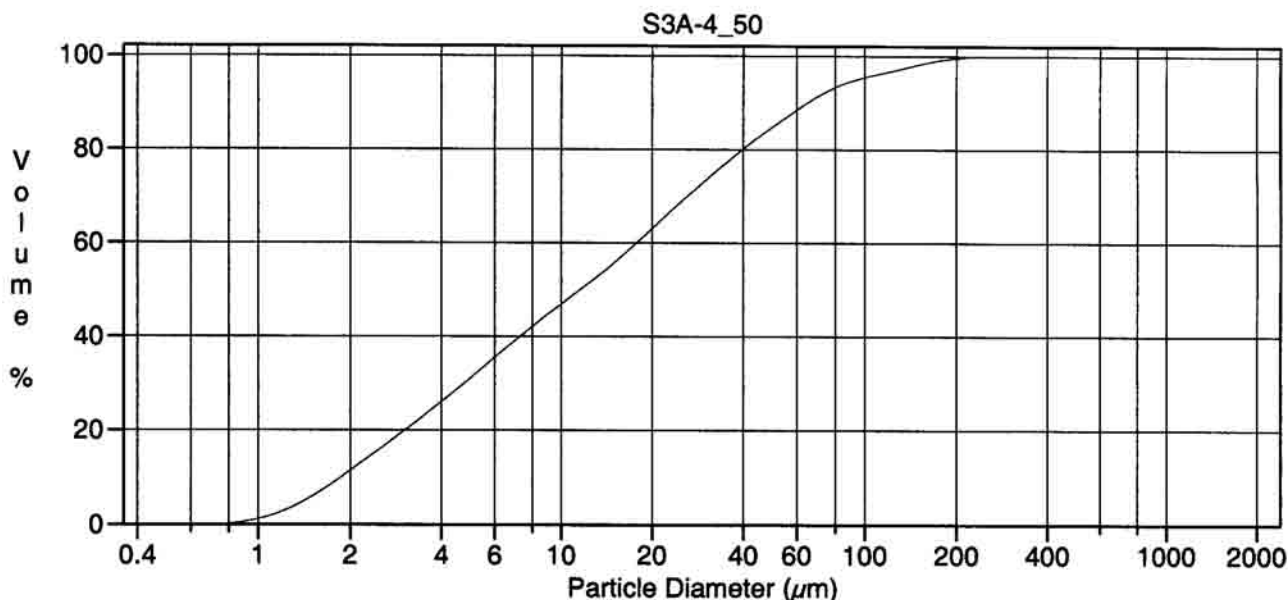
Calculations from 0.375 µm to 2000 µm

Volume	100.0%				
Mean:	36.00 µm	95% Conf. Limits:	0-160.2 µm		
Median:	13.61 µm	S.D.:	63.34 µm		
D(3,2):	5.434 µm	Variance:	4012 µm ²		
Mean/Median Ratio:	2.645	C.V.:	176%		
Mode:	18.00 µm	Skewness:	5.392 Right skewed		
d ₁₀ :	1.857 µm	Kurtosis:	43.71 Leptokurtic		
d ₅₀ :	13.61 µm				
d ₉₀ :	93.68 µm				
Specific Surf. Area	11042 cm ² /ml				

% <	10	25	60	75	90
Size µm	1.857	3.987	21.25	45.02	93.68

22102#.\$02

Particle Diameter µm	Volume %
1.000	10.1
2.000	18.3
5.000	14.3
10.00	8.00
15.00	6.58
20.00	4.96
25.00	13.5
50.00	3.96
60.00	1.14
63.00	2.40
70.00	4.80
90.00	4.56
125.0	5.10
250.0	0.52
500.0	0.46
1000	0.0019



Volume Statistics (Arithmetic) 22103.\$02

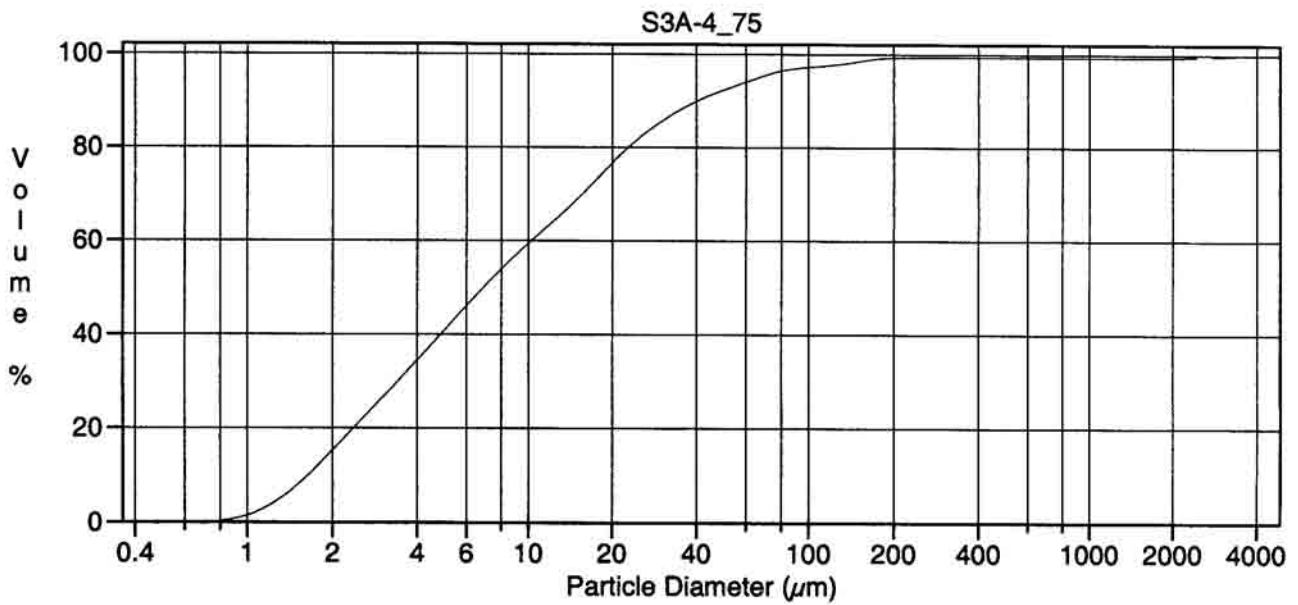
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	25.21 µm	95% Conf. Limits:	0-93.28 µm
Median:	11.54 µm	S.D.:	34.73 µm
D(3,2):	5.235 µm	Variance:	1206 µm ²
Mean/Median Ratio:	2.184	C.V.:	138%
Mode:	19.76 µm	Skewness:	2.704 Right skewed
d ₁₀ :	1.862 µm	Kurtosis:	9.066 Leptokurtic
d ₅₀ :	11.54 µm		
d ₉₀ :	65.05 µm		
Specific Surf. Area	11460 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.862	3.811	17.79	32.11	65.05

22103.\$02

Particle Diameter µm	Volume %
1.000	10.2
2.000	19.7
5.000	15.8
10.00	8.76
15.00	7.34
20.00	5.79
25.00	16.0
50.00	3.63
60.00	0.96
63.00	1.90
70.00	3.26
90.00	2.34
125.0	3.01
250.0	0.069
500.0	0
1000	0



Volume Statistics (Arithmetic)

22104a.\$02

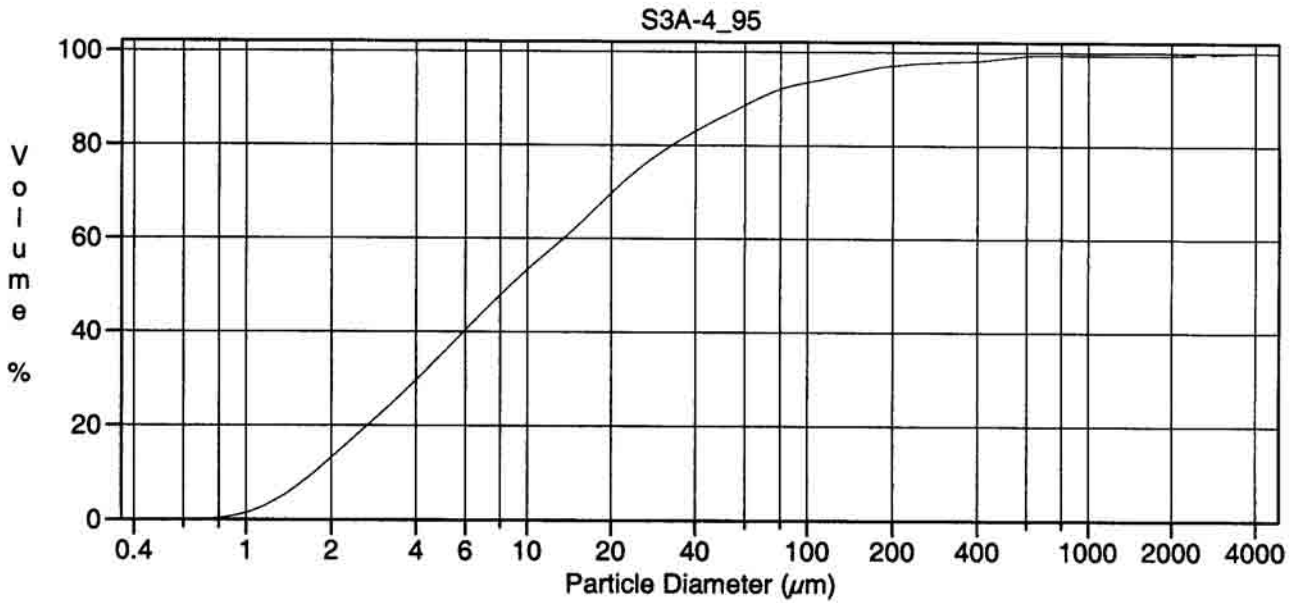
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	33.30 µm	95% Conf. Limits:	0-465.3 µm
Median:	6.901 µm	S.D.:	220.4 µm
D(3,2):	4.168 µm	Variance:	48589 µm ²
Mean/Median Ratio:	4.825	C.V.:	662%
Mode:	5.355 µm	Skewness:	12.44 Right skewed
d ₁₀ :	1.639 µm	Kurtosis:	154.7 Leptokurtic
d ₅₀ :	6.901 µm		
d ₉₀ :	40.26 µm		
Specific Surf. Area	14396 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.639	2.848	10.26	18.79	40.26

22104a.\$02

Particle Diameter µm	Volume %
1.000	13.8
2.000	25.6
5.000	18.6
10.00	9.51
15.00	7.74
20.00	5.40
25.00	10.3
50.00	1.71
60.00	0.47
63.00	0.95
70.00	1.53
90.00	0.81
125.0	1.60
250.0	0.00018
500.0	0
1000	0.61



Volume Statistics (Arithmetic)

22105a.\$02

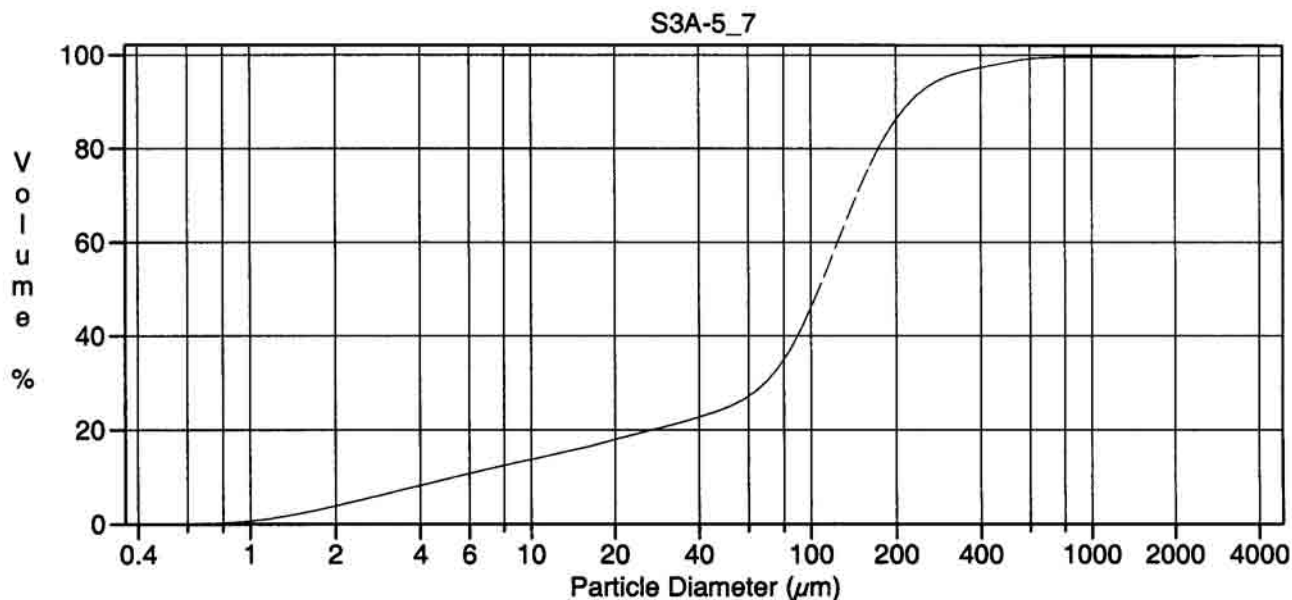
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	44.72 µm	95% Conf. Limits:	0-471.9 µm
Median:	8.732 µm	S.D.:	218.0 µm
D(3,2):	4.673 µm	Variance:	47511 µm ²
Mean/Median Ratio:	5.121	C.V.:	487%
Mode:	5.355 µm	Skewness:	11.60 Right skewed
d ₁₀ :	1.736 µm	Kurtosis:	143.6 Leptokurtic
d ₅₀ :	8.732 µm		
d ₉₀ :	66.55 µm		
Specific Surf. Area	12840 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.736	3.314	13.51	25.15	66.55

22105a.\$02

Particle Diameter µm	Volume %
1.000	11.7
2.000	22.3
5.000	17.8
10.00	9.23
15.00	7.25
20.00	5.17
25.00	11.3
50.00	2.48
60.00	0.67
63.00	1.35
70.00	2.28
90.00	1.80
125.0	2.90
250.0	1.15
500.0	0.67
1000	0.55



Volume Statistics (Arithmetic) 22116a.\$02

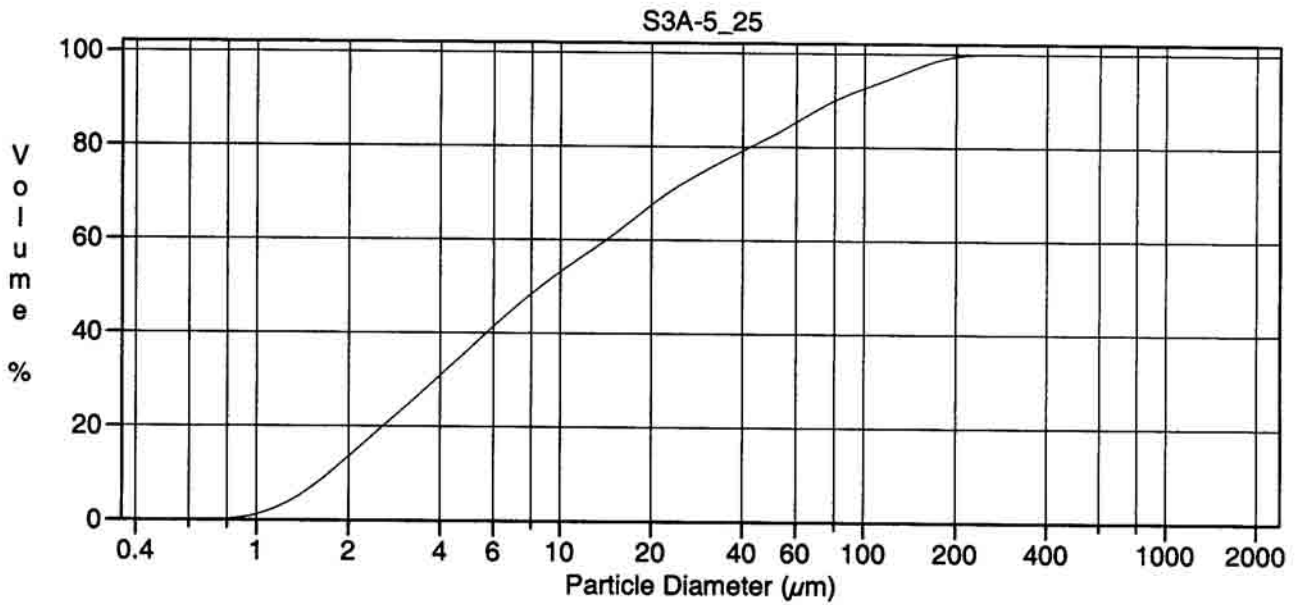
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	129.4 µm	95% Conf. Limits:	0-536.6 µm
Median:	106.8 µm	S.D.:	207.7 µm
D(3,2):	15.02 µm	Variance:	43153 µm ²
Mean/Median Ratio:	1.212	C.V.:	160%
Mode:	127.6 µm	Skewness:	10.23 Right skewed
d ₁₀ :	5.315 µm	Kurtosis:	128.5 Leptokurtic
d ₅₀ :	106.8 µm		
d ₉₀ :	225.8 µm		
Specific Surf. Area	3994 cm ² /ml		

% <	10	25	60	75	90
Size µm	5.315	51.15	124.3	157.8	225.8

22116a.\$02

Particle Diameter µm	Volume %
1.000	3.23
2.000	5.73
5.000	4.14
10.00	2.34
15.00	1.90
20.00	1.49
25.00	5.28
50.00	2.44
60.00	0.87
63.00	2.46
70.00	9.73
90.00	20.1
125.0	32.1
250.0	6.01
500.0	1.08
1000	0.46



Volume Statistics (Arithmetic) 22115.\$02

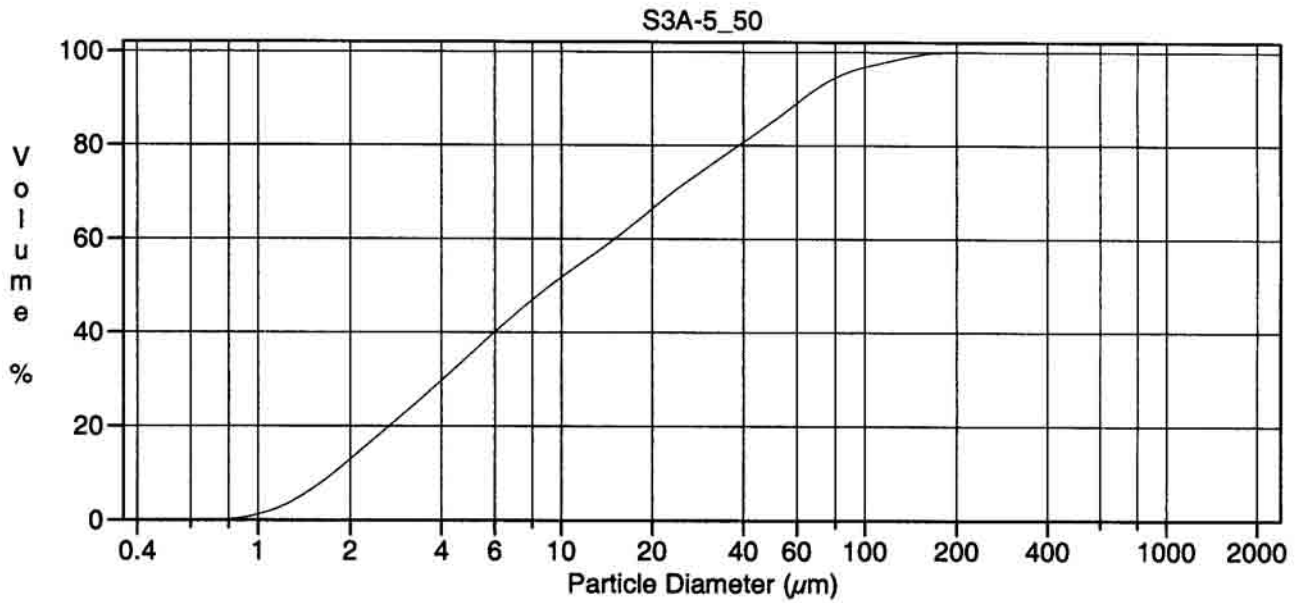
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	26.86 µm	95% Conf. Limits:	0-106.3 µm
Median:	8.616 µm	S.D.:	40.51 µm
D(3,2):	4.666 µm	Variance:	1641 µm ²
Mean/Median Ratio:	3.117	C.V.:	151%
Mode:	5.355 µm	Skewness:	2.353 Right skewed
d ₁₀ :	1.727 µm	Kurtosis:	5.563 Leptokurtic
d ₅₀ :	8.616 µm		
d ₉₀ :	80.31 µm		
Specific Surf. Area	12860 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.727	3.170	14.21	30.28	80.31

22115.\$02

Particle Diameter µm	Volume %
1.000	12.4
2.000	23.1
5.000	16.5
10.00	7.97
15.00	6.33
20.00	4.42
25.00	10.5
50.00	2.95
60.00	0.84
63.00	1.77
70.00	3.49
90.00	3.58
125.0	4.94
250.0	0.033
500.0	0
1000	0



Volume Statistics (Arithmetic)

22114.\$02

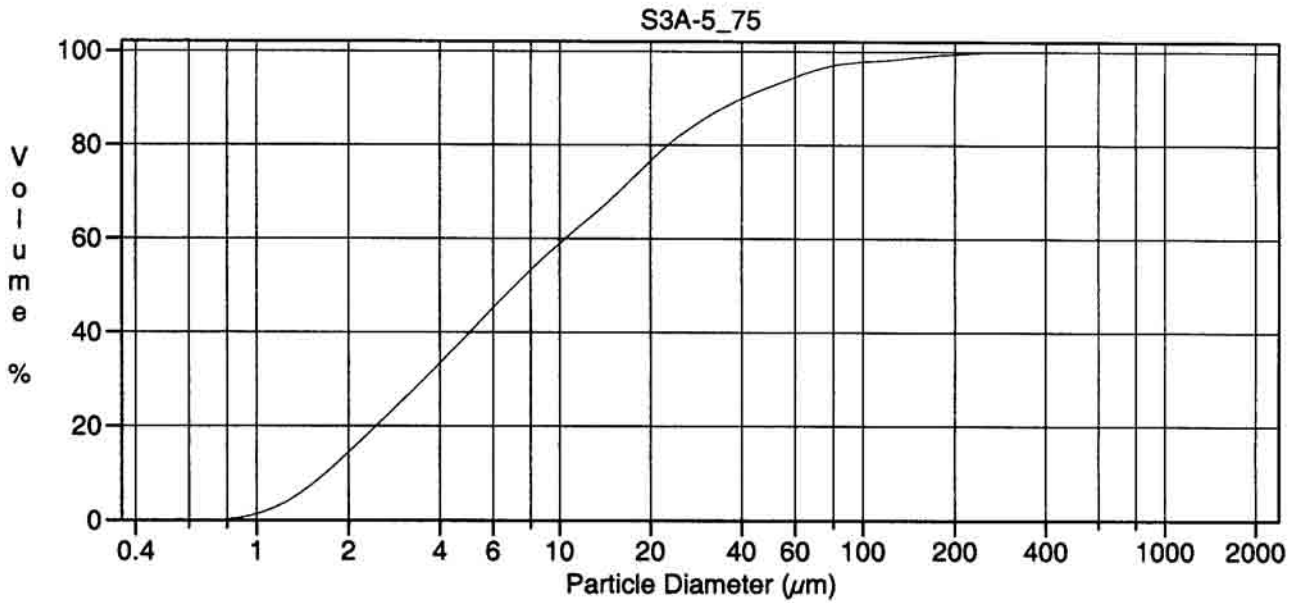
Calculations from 0.375 μm to 2000 μm

Volume	100.0%		
Mean:	22.39 μm	95% Conf. Limits:	0-80.16 μm
Median:	9.189 μm	S.D.:	29.47 μm
D(3,2):	4.778 μm	Variance:	868.5 μm ²
Mean/Median Ratio:	2.437	C.V.:	132%
Mode:	5.355 μm	Skewness:	2.192 Right skewed
d ₁₀ :	1.761 μm	Kurtosis:	5.390 Leptokurtic
d ₅₀ :	9.189 μm		
d ₉₀ :	62.66 μm		
Specific Surf. Area	12557 cm ² /ml		

% <	10	25	60	75	90
Size μm	1.761	3.301	15.05	29.96	62.66

22114.\$02

Particle Diameter μm	Volume %
1.000	11.7
2.000	22.4
5.000	16.4
10.00	8.14
15.00	6.53
20.00	4.90
25.00	13.7
50.00	3.93
60.00	1.09
63.00	2.17
70.00	3.60
90.00	2.41
125.0	1.70
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic) 22113.\$02

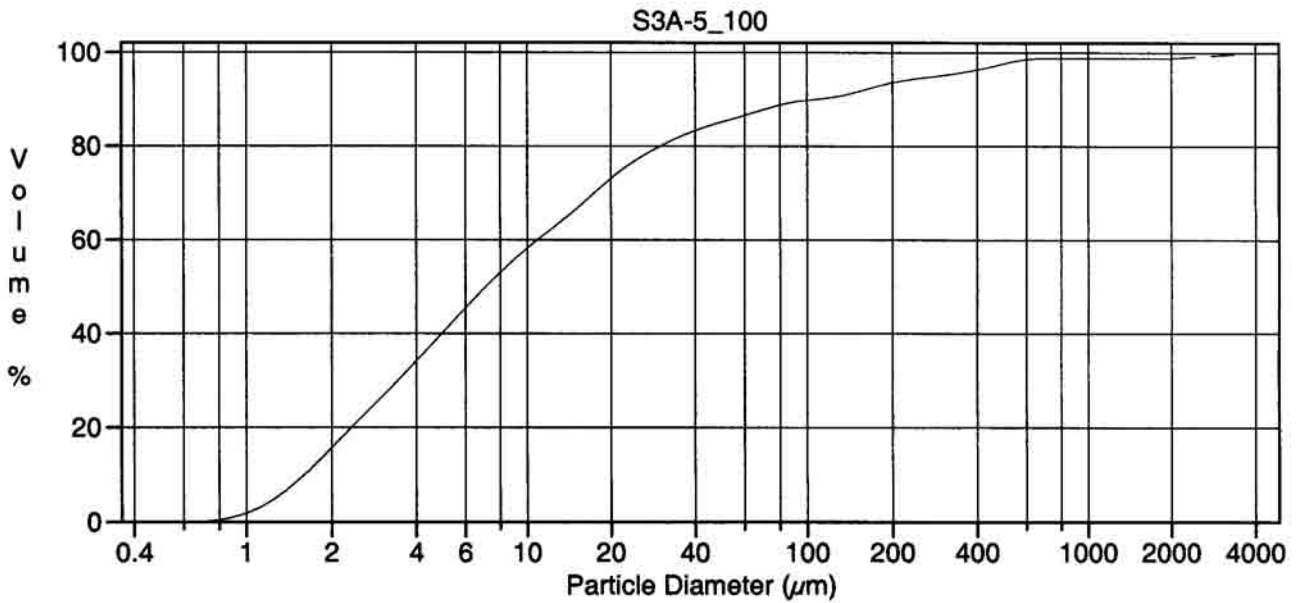
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	16.97 µm	95% Conf. Limits:	0-72.99 µm	
Median:	7.108 µm	S.D.:	28.58 µm	
D(3,2):	4.282 µm	Variance:	817.0 µm ²	
Mean/Median Ratio:	2.387	C.V.:	168%	
Mode:	5.355 µm	Skewness:	4.498 Right skewed	
d ₁₀ :	1.683 µm	Kurtosis:	26.90 Leptokurtic	
d ₅₀ :	7.108 µm			
d ₉₀ :	40.34 µm			
Specific Surf. Area	14012 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.683	2.961	10.44	18.87	40.34

22113.\$02

Particle Diameter µm	Volume %
1.000	13.1
2.000	25.4
5.000	19.1
10.00	9.81
15.00	7.78
20.00	5.43
25.00	10.6
50.00	1.98
60.00	0.52
63.00	1.02
70.00	1.46
90.00	0.75
125.0	1.54
250.0	0.17
500.0	0
1000	0



Volume Statistics (Arithmetic)

22112a.\$02

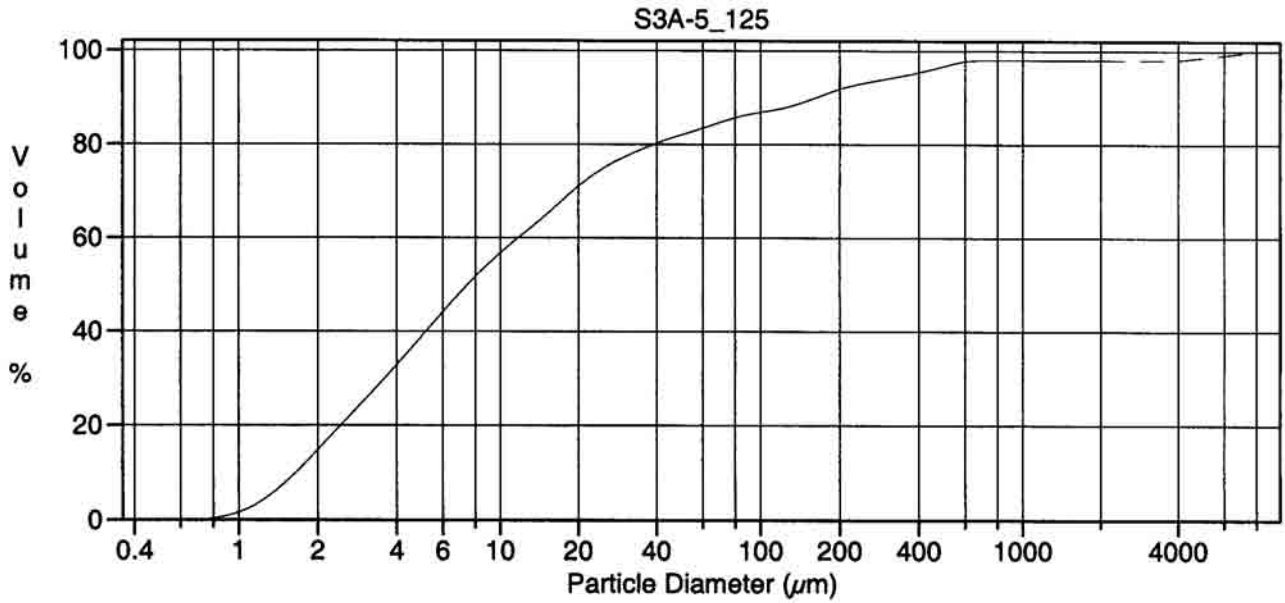
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	71.21 µm	95% Conf. Limits:	0-691.8 µm
Median:	7.107 µm	S.D.:	316.6 µm
D(3,2):	4.187 µm	Variance:	100251 µm ²
Mean/Median Ratio:	10.02	C.V.:	445%
Mode:	5.355 µm	Skewness:	7.932 Right skewed
d ₁₀ :	1.602 µm	Kurtosis:	65.54 Leptokurtic
d ₅₀ :	7.107 µm		
d ₉₀ :	109.1 µm		
Specific Surf. Area	14331 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.602	2.849	10.89	21.97	109.1

22112a.\$02

Particle Diameter µm	Volume %
1.000	13.8
2.000	24.6
5.000	17.9
10.00	8.43
15.00	6.48
20.00	4.23
25.00	7.83
50.00	1.38
60.00	0.40
63.00	0.87
70.00	1.58
90.00	1.10
125.0	4.01
250.0	3.14
500.0	1.17
1000	1.19



Volume Statistics (Arithmetic)

22111#a.\$02

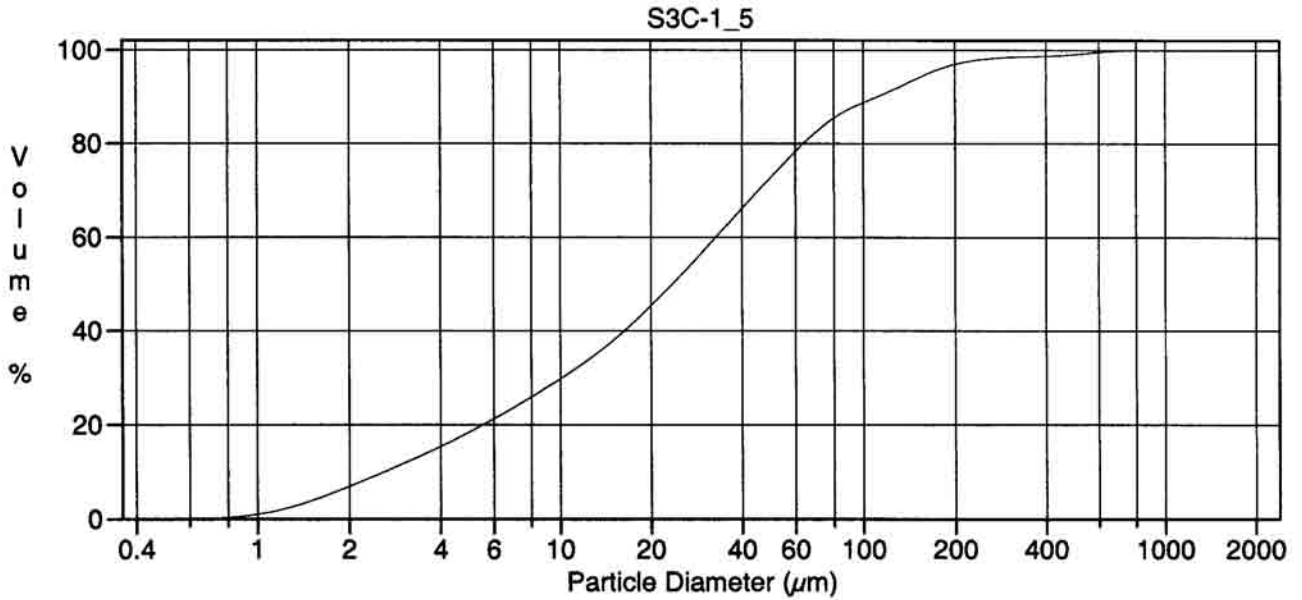
Calculations from 0.375 µm to 8000 µm

Volume	100.0%		
Mean:	150.8 µm	95% Conf. Limits:	0-1673 µm
Median:	7.472 µm	S.D.:	776.6 µm
D(3,2):	4.359 µm	Variance:	603171 µm ²
Mean/Median Ratio:	20.18	C.V.:	515%
Mode:	5.355 µm	Skewness:	6.840 Right skewed
d ₁₀ :	1.645 µm	Kurtosis:	45.51 Leptokurtic
d ₅₀ :	7.472 µm		
d ₉₀ :	162.3 µm		
Specific Surf. Area	13765 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.645	2.966	11.71	24.99	162.3

22111#a.\$02

Particle Diameter µm	Volume %
1.000	13.2
2.000	24.2
5.000	17.7
10.00	8.15
15.00	6.18
20.00	3.90
25.00	7.02
50.00	1.39
60.00	0.40
63.00	0.87
70.00	1.69
90.00	1.52
125.0	5.27
250.0	3.64
500.0	1.28
1000	1.92



Volume Statistics (Arithmetic)

22117#.\$02

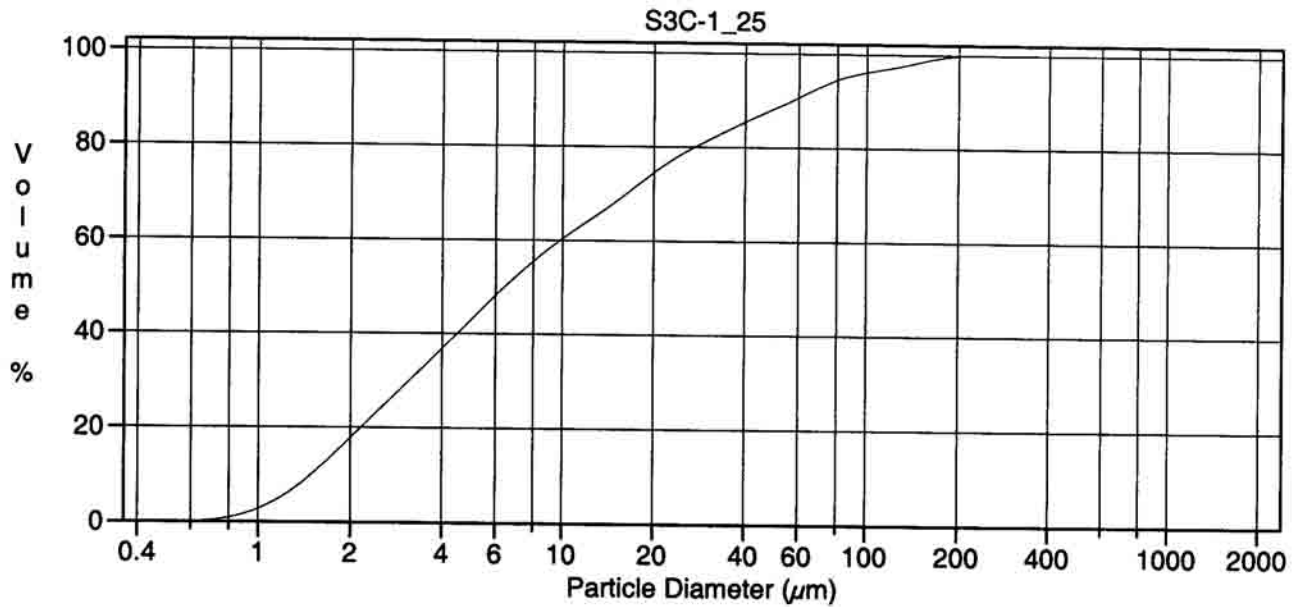
Calculations from 0.375 µm to 2000 µm

Volume	100.0%	95% Conf. Limits:	0-197.0 µm
Mean:	46.62 µm	S.D.:	76.73 µm
Median:	23.54 µm	Variance:	5888 µm ²
D(3,2):	7.728 µm	C.V.:	165%
Mean/Median Ratio:	1.981	Skewness:	4.694 Right skewed
Mode:	34.58 µm	Kurtosis:	29.10 Leptokurtic
d ₁₀ :	2.590 µm		
d ₅₀ :	23.54 µm		
d ₉₀ :	111.1 µm		
Specific Surf. Area	7764 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.590	7.570	32.76	53.57	111.1

22117#.\$02

Particle Diameter µm	Volume %
1.000	5.96
2.000	11.6
5.000	11.2
10.00	8.20
15.00	7.41
20.00	6.39
25.00	21.1
50.00	5.38
60.00	1.42
63.00	2.77
70.00	4.85
90.00	4.11
125.0	6.60
250.0	1.04
500.0	0.90
1000	0



Volume Statistics (Arithmetic) 22118.\$02

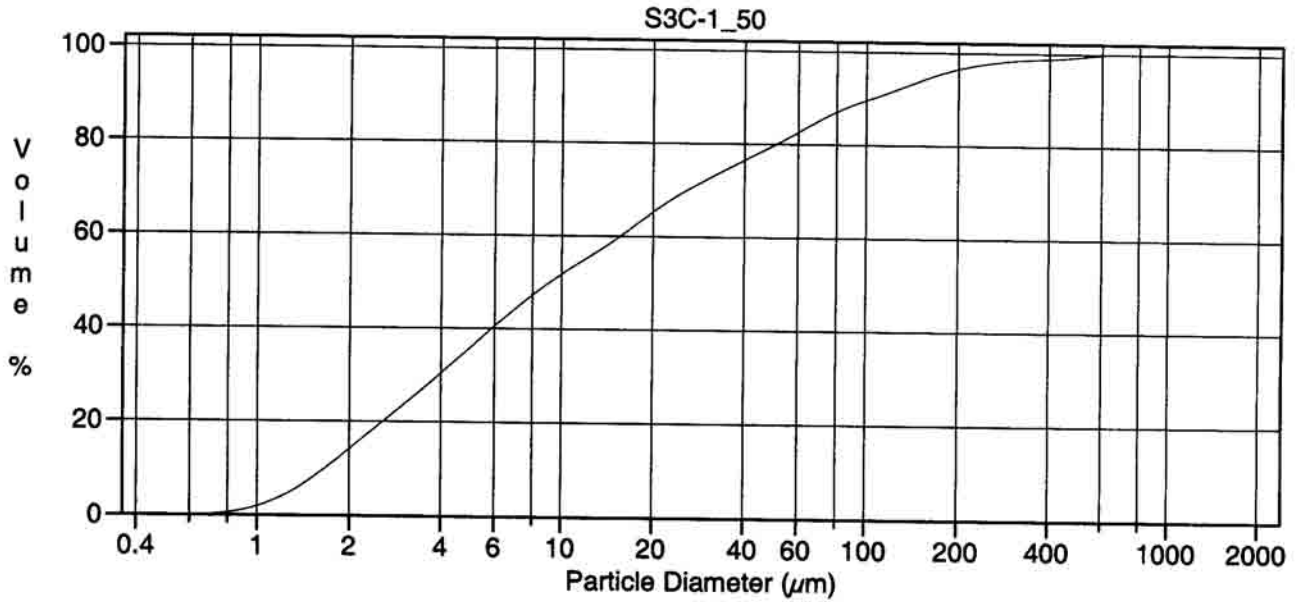
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	19.68 µm	95% Conf. Limits:	0-82.45 µm
Median:	6.434 µm	S.D.:	32.02 µm
D(3,2):	3.823 µm	Variance:	1025 µm ²
Mean/Median Ratio:	3.059	C.V.:	163%
Mode:	4.878 µm	Skewness:	2.964 Right skewed
d ₁₀ :	1.486 µm	Kurtosis:	9.913 Leptokurtic
d ₅₀ :	6.434 µm		
d ₉₀ :	56.97 µm		
Specific Surf. Area	15694 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.486	2.595	9.814	20.50	56.97

22118.\$02

Particle Diameter µm	Volume %
1.000	15.1
2.000	25.2
5.000	17.3
10.00	7.90
15.00	6.20
20.00	4.16
25.00	9.65
50.00	2.44
60.00	0.70
63.00	1.47
70.00	2.64
90.00	1.80
125.0	2.68
250.0	0.0033
500.0	0
1000	0



Volume Statistics (Arithmetic) 22119.\$02

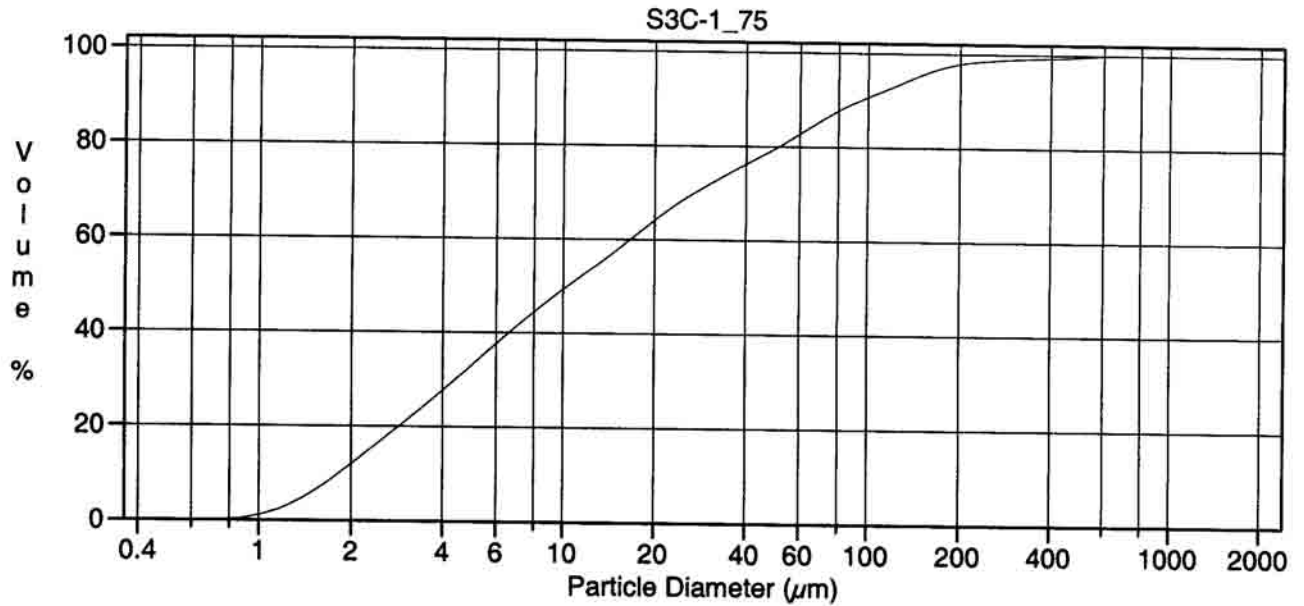
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	37.49 µm	95% Conf. Limits:	0-184.2 µm
Median:	9.149 µm	S.D.:	74.84 µm
D(3,2):	4.603 µm	Variance:	5601 µm ²
Mean/Median Ratio:	4.098	C.V.:	200%
Mode:	5.355 µm	Skewness:	4.267 Right skewed
d ₁₀ :	1.663 µm	Kurtosis:	23.12 Leptokurtic
d ₅₀ :	9.149 µm		
d ₉₀ :	104.3 µm		
Specific Surf. Area	13035 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.663	3.192	15.58	36.00	104.3

22119.\$02

Particle Diameter µm	Volume %
1.000	12.3
2.000	21.7
5.000	15.8
10.00	7.49
15.00	6.00
20.00	4.19
25.00	10.3
50.00	2.84
60.00	0.81
63.00	1.71
70.00	3.38
90.00	3.38
125.0	5.90
250.0	1.55
500.0	0.70
1000	0



Volume Statistics (Arithmetic) 22120.\$02

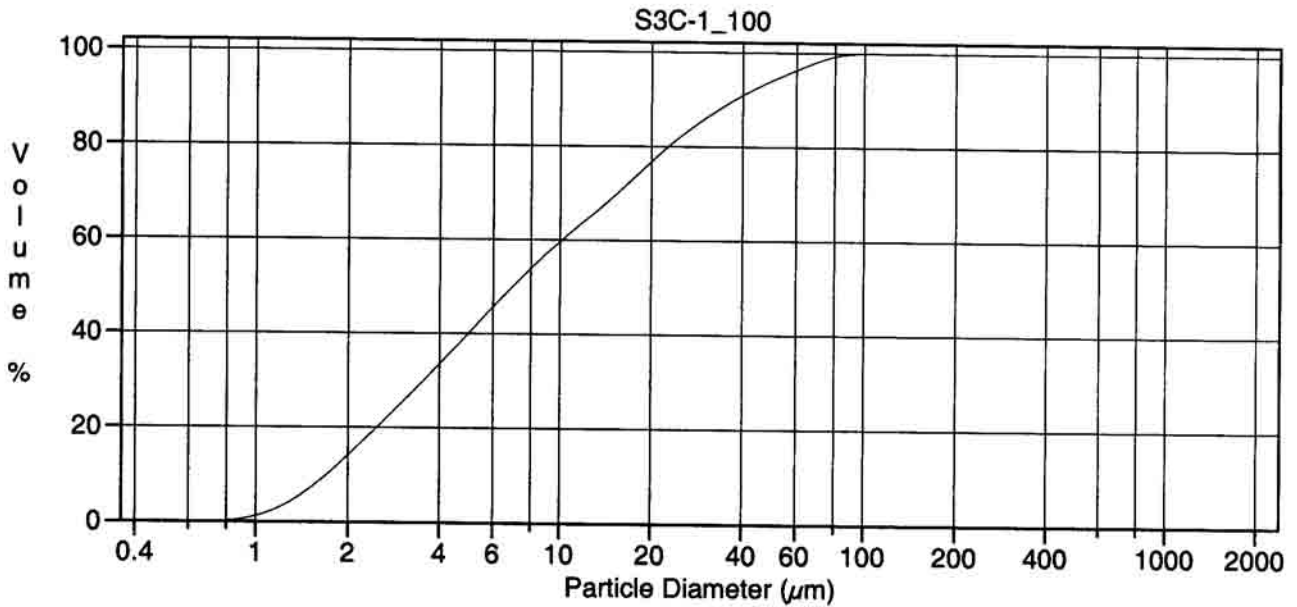
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	34.31 µm	95% Conf. Limits:	0-158.4 µm	
Median:	10.34 µm	S.D.:	63.32 µm	
D(3,2):	5.078 µm	Variance:	4010 µm ²	
Mean/Median Ratio:	3.318	C.V.:	185%	
Mode:	5.355 µm	Skewness:	4.537 Right skewed	
d ₁₀ :	1.821 µm	Kurtosis:	28.89 Leptokurtic	
d ₅₀ :	10.34 µm			
d ₉₀ :	94.78 µm			
Specific Surf. Area	11816 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.821	3.563	16.66	36.79	94.78

22120.\$02

Particle Diameter µm	Volume %
1.000	10.9
2.000	21.1
5.000	16.2
10.00	8.34
15.00	6.47
20.00	4.55
25.00	11.0
50.00	3.08
60.00	0.89
63.00	1.90
70.00	3.85
90.00	3.92
125.0	5.34
250.0	0.98
500.0	0.41
1000	0



Volume Statistics (Arithmetic) 22121.\$02

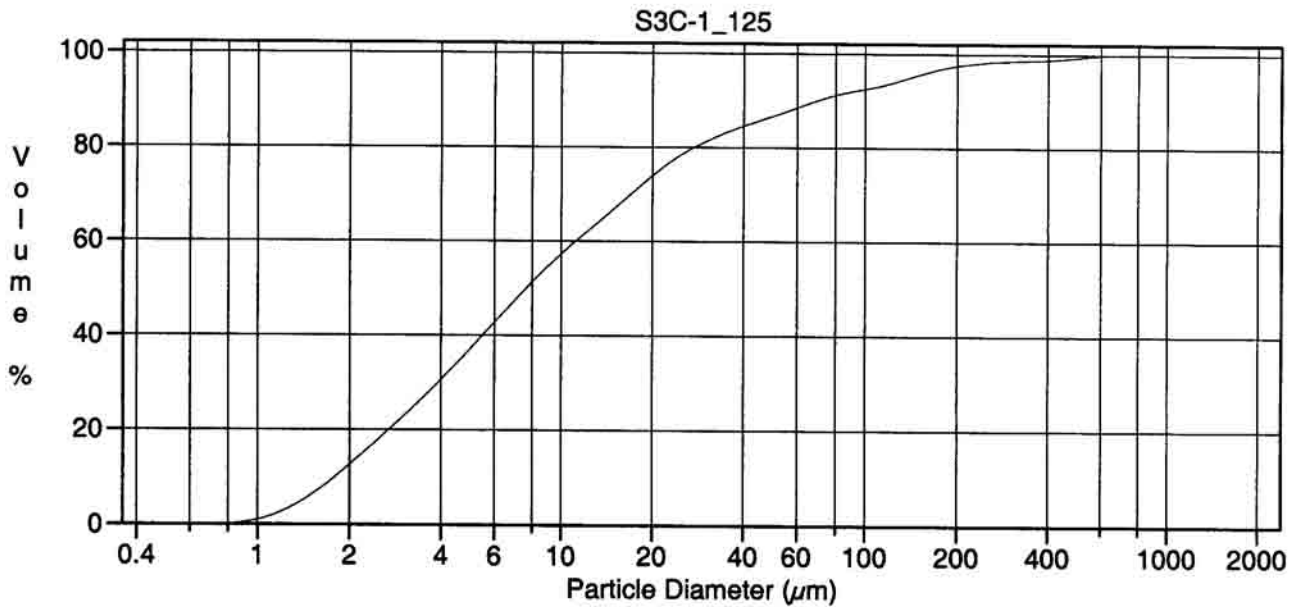
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	14.21 µm	95% Conf. Limits:	0-47.69 µm	
Median:	6.968 µm	S.D.:	17.08 µm	
D(3,2):	4.284 µm	Variance:	291.7 µm ²	
Mean/Median Ratio:	2.040	C.V.:	120%	
Mode:	5.355 µm	Skewness:	2.036 Right skewed	
d ₁₀ :	1.700 µm	Kurtosis:	4.132 Leptokurtic	
d ₅₀ :	6.968 µm			
d ₉₀ :	37.78 µm			
Specific Surf. Area	14005 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.700	2.973	10.16	18.70	37.78

22121.\$02

Particle Diameter µm	Volume %
1.000	12.9
2.000	26.0
5.000	19.5
10.00	9.61
15.00	7.52
20.00	5.40
25.00	11.9
50.00	2.29
60.00	0.61
63.00	1.18
70.00	1.67
90.00	0.22
125.0	0
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic) 22122.\$02

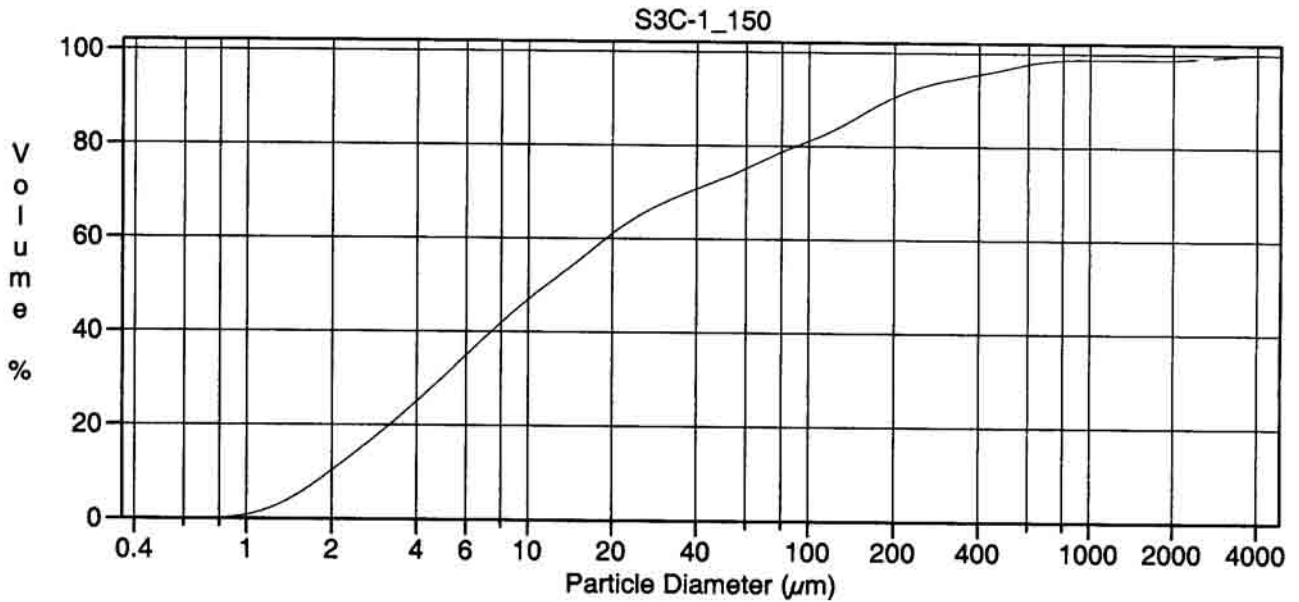
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	29.32 µm	95% Conf. Limits:	0-164.3 µm	
Median:	7.668 µm	S.D.:	68.86 µm	
D(3,2):	4.626 µm	Variance:	4742 µm ²	
Mean/Median Ratio:	3.823	C.V.:	235%	
Mode:	5.878 µm	Skewness:	5.179 Right skewed	
d ₁₀ :	1.787 µm	Kurtosis:	32.44 Leptokurtic	
d ₅₀ :	7.668 µm			
d ₉₀ :	69.22 µm			
Specific Surf. Area	12970 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.787	3.262	11.18	20.95	69.22

22122.\$02

Particle Diameter µm	Volume %
1.000	11.6
2.000	24.5
5.000	20.1
10.00	9.69
15.00	6.99
20.00	4.57
25.00	8.19
50.00	1.83
60.00	0.52
63.00	1.07
70.00	1.84
90.00	2.02
125.0	4.27
250.0	1.12
500.0	0.64
1000	0



Volume Statistics (Arithmetic)

22123a.\$02

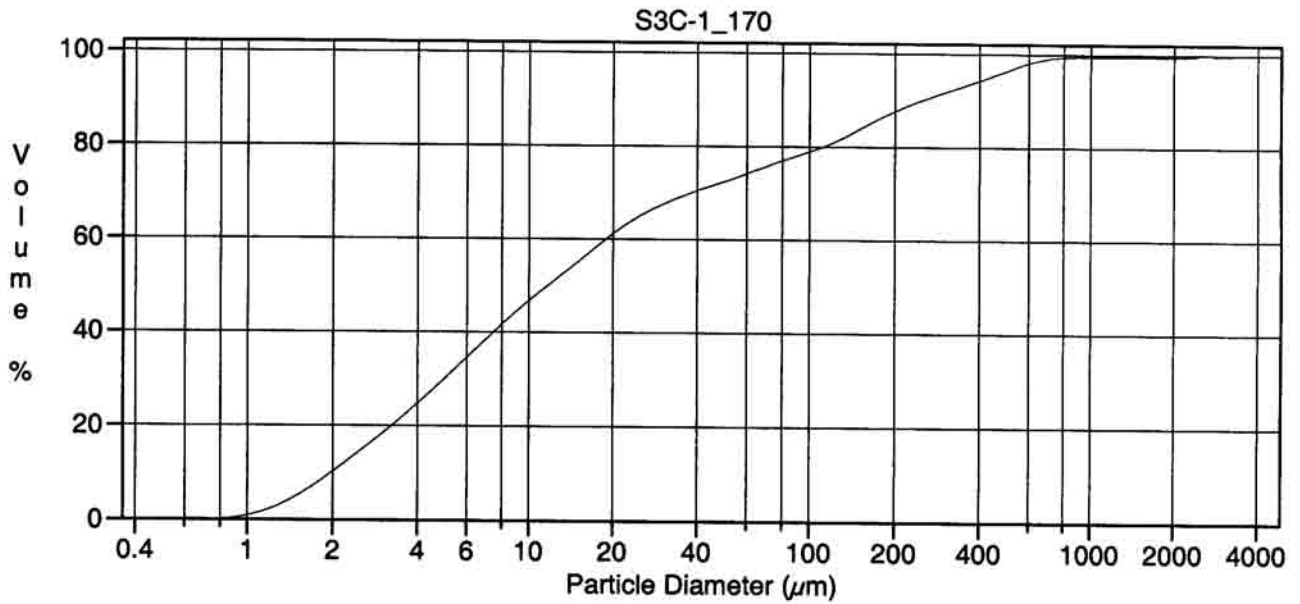
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	92.73 µm	95% Conf. Limits:	0-720.7 µm
Median:	11.62 µm	S.D.:	320.4 µm
D(3,2):	5.611 µm	Variance:	102643 µm ²
Mean/Median Ratio:	7.978	C.V.:	345%
Mode:	5.878 µm	Skewness:	7.413 Right skewed
d ₁₀ :	1.969 µm	Kurtosis:	59.45 Leptokurtic
d ₅₀ :	11.62 µm		
d ₉₀ :	191.6 µm		
Specific Surf. Area	10692 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.969	3.997	18.99	59.32	191.6

22123a.\$02

Particle Diameter µm	Volume %
1.000	9.51
2.000	20.1
5.000	16.5
10.00	8.13
15.00	5.99
20.00	3.98
25.00	8.04
50.00	2.08
60.00	0.61
63.00	1.33
70.00	2.89
90.00	3.76
125.0	9.02
250.0	4.00
500.0	2.08
1000	1.18



Volume Statistics (Arithmetic)

22124a.\$02

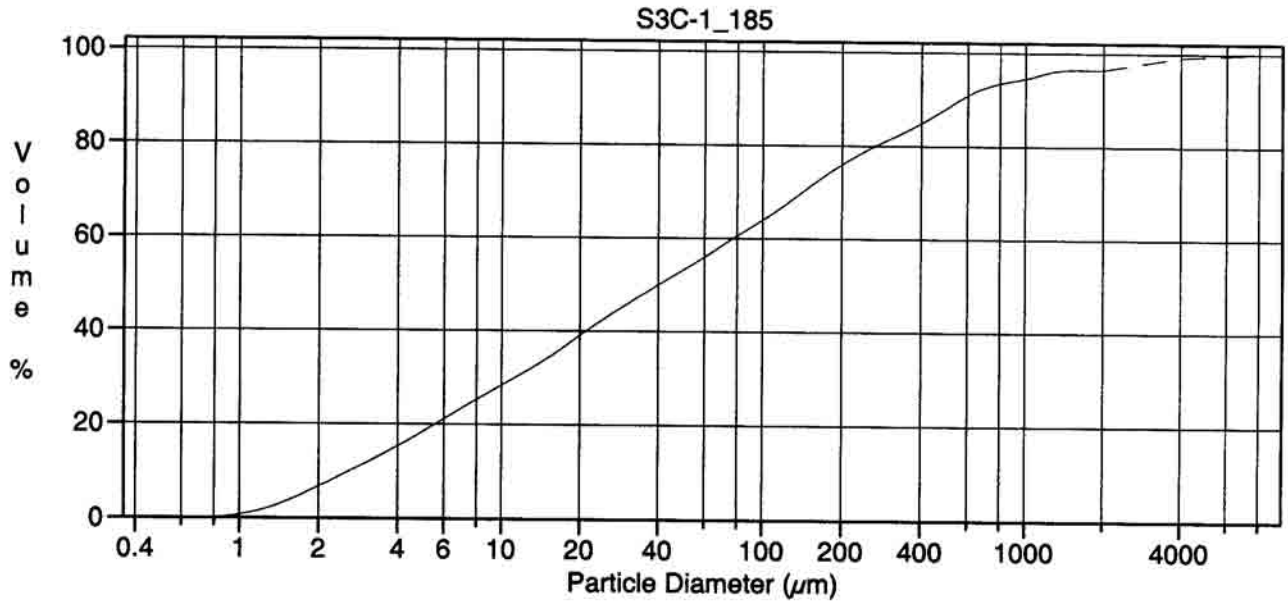
Calculations from 0.375 µm to 4000 µm

Volume	100.0%		
Mean:	84.83 µm	95% Conf. Limits:	0-530.3 µm
Median:	11.66 µm	S.D.:	227.3 µm
D(3,2):	5.622 µm	Variance:	51661 µm ²
Mean/Median Ratio:	7.272	C.V.:	268%
Mode:	5.878 µm	Skewness:	8.120 Right skewed
d ₁₀ :	1.971 µm	Kurtosis:	89.63 Leptokurtic
d ₅₀ :	11.66 µm		
d ₉₀ :	248.3 µm		
Specific Surf. Area	10672 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.971	4.045	18.88	65.27	248.3

22124a.\$02

Particle Diameter µm	Volume %
1.000	9.37
2.000	19.8
5.000	16.7
10.00	8.38
15.00	6.01
20.00	3.90
25.00	7.45
50.00	1.68
60.00	0.49
63.00	1.06
70.00	2.31
90.00	3.26
125.0	8.79
250.0	6.38
500.0	3.12
1000	0.43



Volume Statistics (Arithmetic)

22125a.\$02

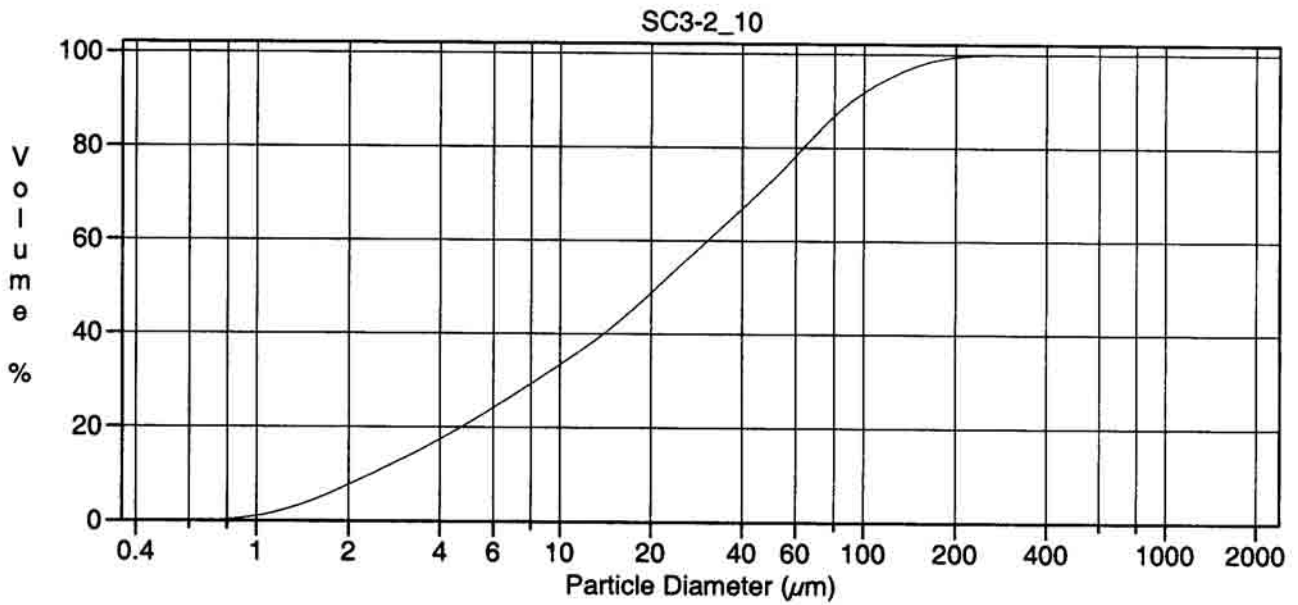
Calculations from 0.375 µm to 8000 µm

Volume	100.0%		
Mean:	259.1 µm	95% Conf. Limits:	0-1610 µm
Median:	40.07 µm	S.D.:	689.5 µm
D(3,2):	8.572 µm	Variance:	475393 µm ²
Mean/Median Ratio:	6.467	C.V.:	266%
Mode:	2828 µm	Skewness:	5.200 Right skewed
d ₁₀ :	2.617 µm	Kurtosis:	31.67 Leptokurtic
d ₅₀ :	40.07 µm		
d ₉₀ :	564.8 µm		
Specific Surf. Area	7000 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.617	7.852	77.26	187.5	564.8

22125a.\$02

Particle Diameter µm	Volume %
1.000	6.05
2.000	11.7
5.000	9.91
10.00	5.79
15.00	4.92
20.00	3.77
25.00	10.3
50.00	2.77
60.00	0.79
63.00	1.70
70.00	3.92
90.00	5.37
125.0	11.4
250.0	9.05
500.0	6.36
1000	5.48



Volume Statistics (Arithmetic) 22135.\$02

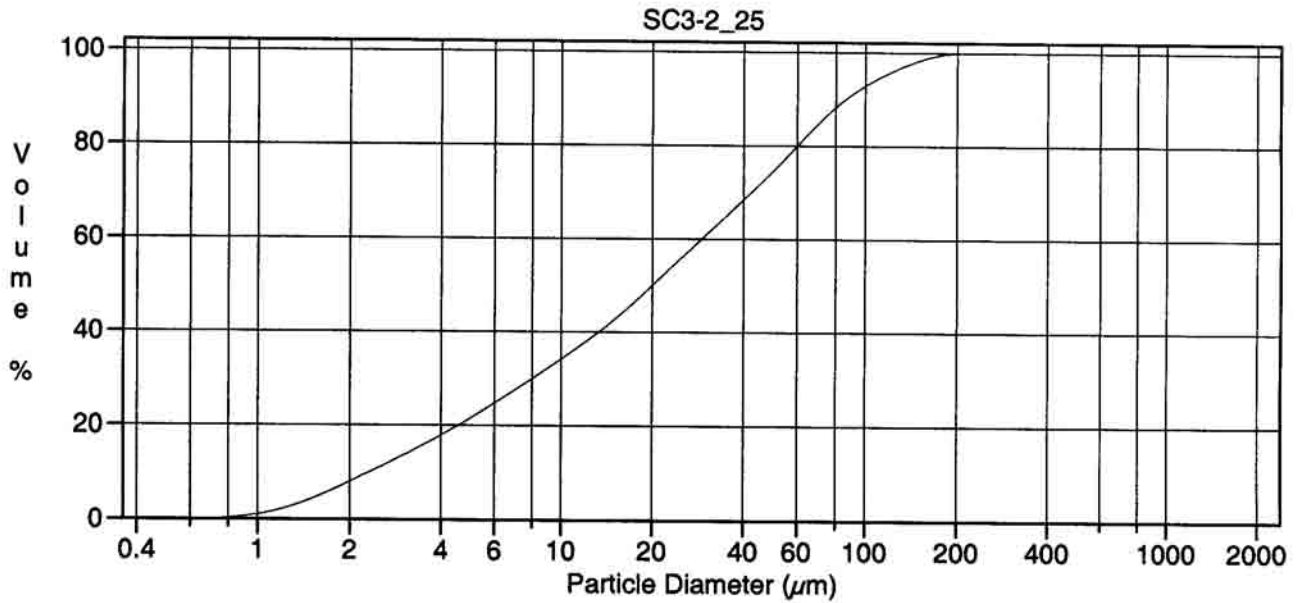
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	36.39 µm	95% Conf. Limits:	0-116.6 µm
Median:	20.92 µm	S.D.:	40.90 µm
D(3,2):	7.089 µm	Variance:	1673 µm ²
Mean/Median Ratio:	1.739	C.V.:	112%
Mode:	60.52 µm	Skewness:	1.852 Right skewed
d ₁₀ :	2.366 µm	Kurtosis:	4.187 Leptokurtic
d ₅₀ :	20.92 µm		
d ₉₀ :	91.46 µm		
Specific Surf. Area	8464 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.366	6.289	30.73	53.80	91.46

22135.\$02

Particle Diameter µm	Volume %
1.000	6.72
2.000	13.3
5.000	12.3
10.00	8.24
15.00	7.16
20.00	5.85
25.00	18.2
50.00	5.36
60.00	1.52
63.00	3.21
70.00	6.63
90.00	5.75
125.0	4.49
250.0	0.14
500.0	0
1000	0



Volume Statistics (Arithmetic) 22136.\$02

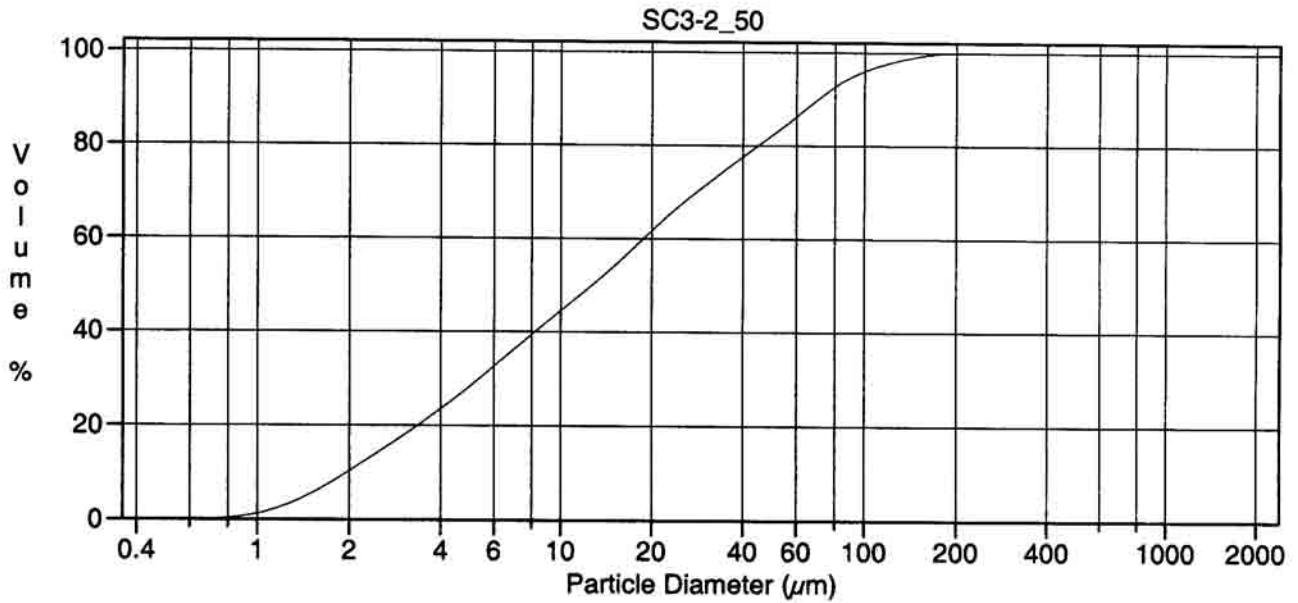
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	34.17 µm	95% Conf. Limits:	0-107.4 µm
Median:	20.02 µm	S.D.:	37.37 µm
D(3,2):	6.932 µm	Variance:	1397 µm ²
Mean/Median Ratio:	1.707	C.V.:	109%
Mode:	60.52 µm	Skewness:	1.631 Right skewed
d ₁₀ :	2.311 µm	Kurtosis:	2.593 Leptokurtic
d ₅₀ :	20.02 µm		
d ₉₀ :	86.45 µm		
Specific Surf. Area	8655 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.311	6.099	29.14	50.75	86.45

22136.\$02

Particle Diameter µm	Volume %
1.000	6.98
2.000	13.5
5.000	12.6
10.00	8.49
15.00	7.33
20.00	5.97
25.00	18.6
50.00	5.39
60.00	1.51
63.00	3.14
70.00	6.25
90.00	5.29
125.0	3.85
250.0	0.00085
500.0	0
1000	0



Volume Statistics (Arithmetic) 22137.\$02

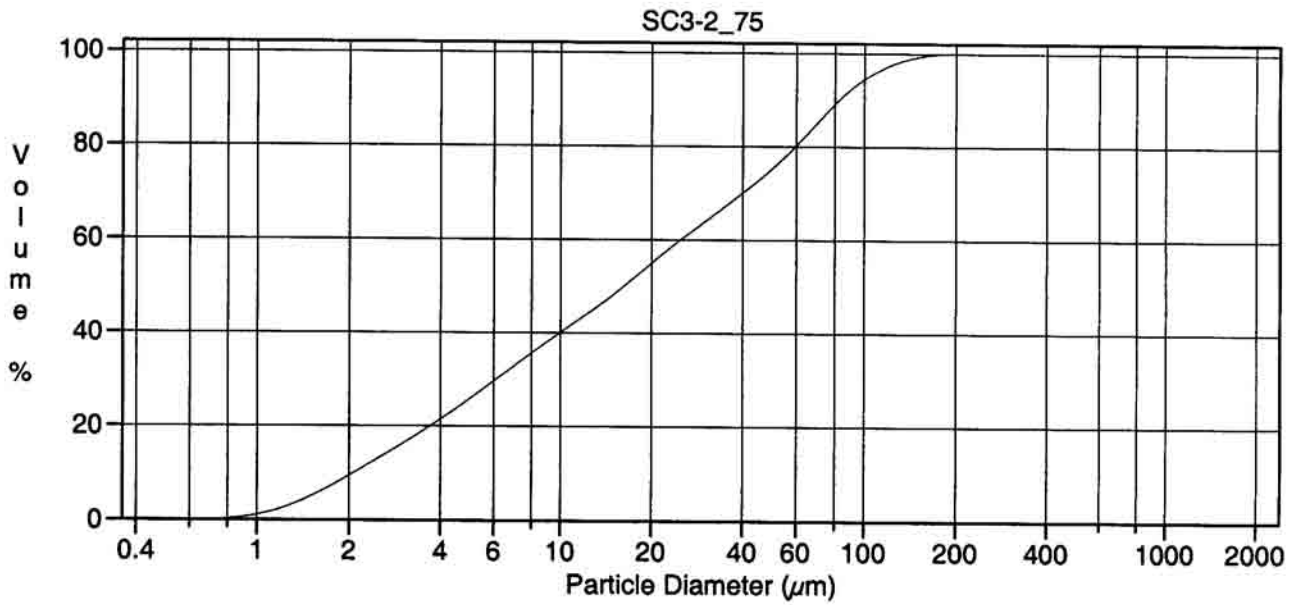
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	25.81 µm	95% Conf. Limits:	0-87.68 µm
Median:	12.70 µm	S.D.:	31.57 µm
D(3,2):	5.566 µm	Variance:	996.7 µm ²
Mean/Median Ratio:	2.032	C.V.:	122%
Mode:	18.00 µm	Skewness:	1.976 Right skewed
d ₁₀ :	1.960 µm	Kurtosis:	4.222 Leptokurtic
d ₅₀ :	12.70 µm		
d ₉₀ :	70.63 µm		
Specific Surf. Area	10779 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.960	4.280	18.78	35.36	70.63

22137.\$02

Particle Diameter µm	Volume %
1.000	9.11
2.000	18.0
5.000	16.1
10.00	9.50
15.00	7.63
20.00	5.65
25.00	14.9
50.00	4.03
60.00	1.15
63.00	2.45
70.00	4.83
90.00	3.40
125.0	1.96
250.0	0.000038
500.0	0
1000	0



Volume Statistics (Arithmetic)

22138#.\$02

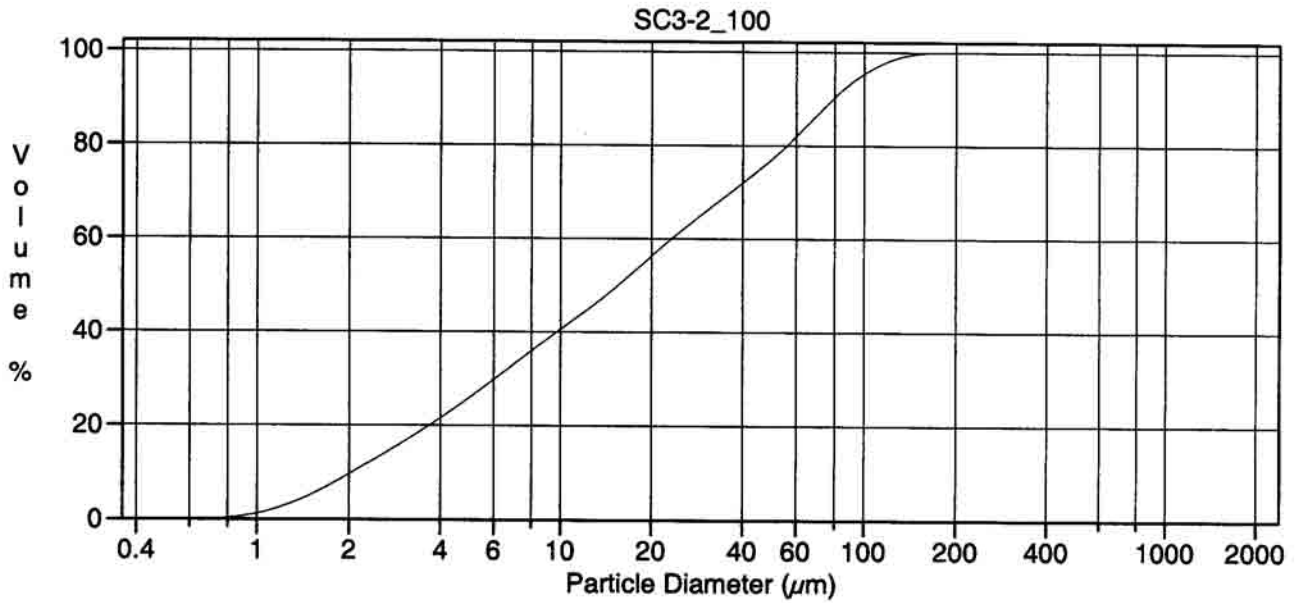
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	31.12 µm	95% Conf. Limits:	0-99.08 µm
Median:	16.16 µm	S.D.:	34.67 µm
D(3,2):	6.098 µm	Variance:	1202 µm ²
Mean/Median Ratio:	1.926	C.V.:	111%
Mode:	66.44 µm	Skewness:	1.456 Right skewed
d ₁₀ :	2.068 µm	Kurtosis:	1.721 Leptokurtic
d ₅₀ :	16.16 µm		
d ₉₀ :	82.75 µm		
Specific Surf. Area	9839 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.068	4.787	24.96	49.48	82.75

22138#.\$02

Particle Diameter µm	Volume %
1.000	8.33
2.000	16.4
5.000	14.2
10.00	8.22
15.00	6.66
20.00	5.04
25.00	15.2
50.00	4.95
60.00	1.48
63.00	3.28
70.00	7.20
90.00	5.57
125.0	2.26
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic) 22139.\$02

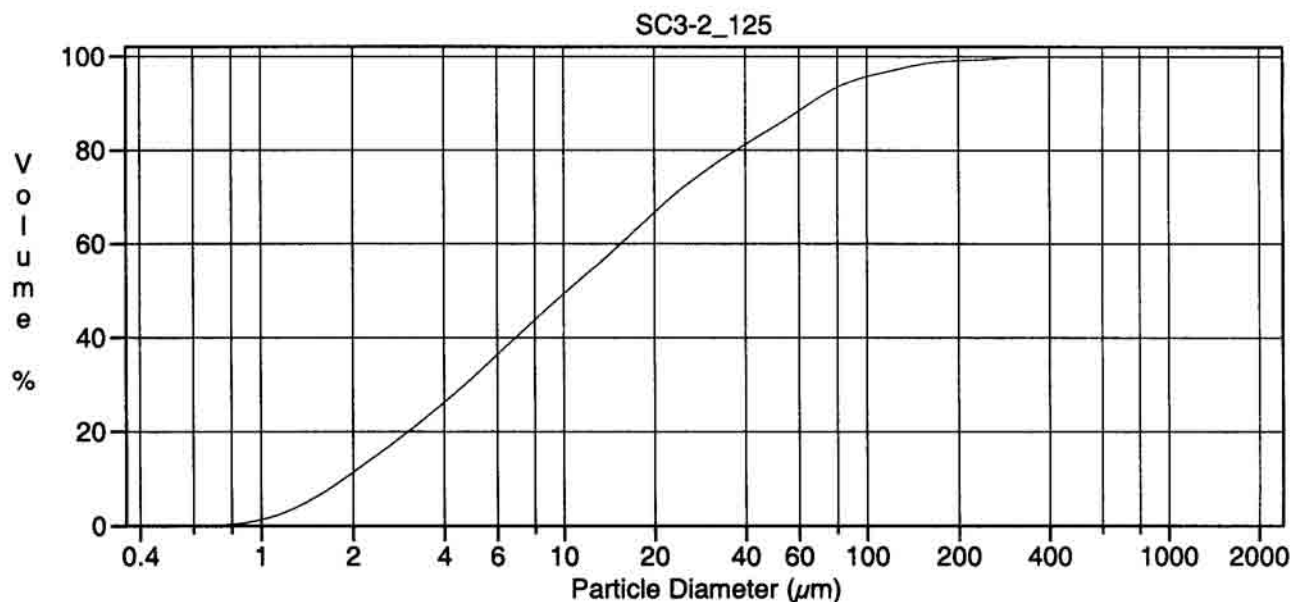
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	29.32 µm	95% Conf. Limits:	0-92.88 µm
Median:	15.53 µm	S.D.:	32.43 µm
D(3,2):	5.981 µm	Variance:	1052 µm ²
Mean/Median Ratio:	1.888	C.V.:	111%
Mode:	66.44 µm	Skewness:	1.425 Right skewed
d ₁₀ :	2.039 µm	Kurtosis:	1.473 Leptokurtic
d ₅₀ :	15.53 µm		
d ₉₀ :	79.09 µm		
Specific Surf. Area	10032 cm ² /ml		

% <	10	25	60	75	90
Size µm	2.039	4.760	23.36	45.69	79.09

22139.\$02

Particle Diameter µm	Volume %
1.000	8.41
2.000	16.3
5.000	14.6
10.00	8.62
15.00	7.04
20.00	5.38
25.00	15.5
50.00	4.86
60.00	1.43
63.00	3.12
70.00	6.67
90.00	5.28
125.0	1.49
250.0	0
500.0	0
1000	0



Volume Statistics (Arithmetic)

22140#.\$02

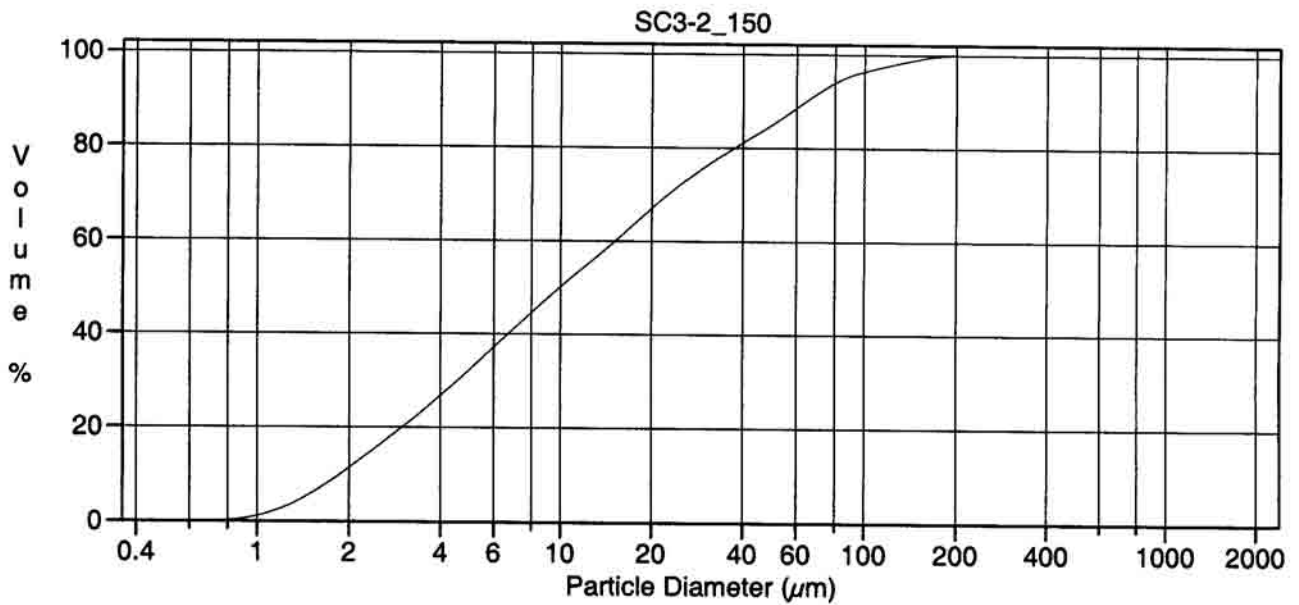
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	24.71 µm	95% Conf. Limits:	0-99.61 µm
Median:	10.29 µm	S.D.:	38.21 µm
D(3,2):	5.114 µm	Variance:	1460 µm ²
Mean/Median Ratio:	2.401	C.V.:	155%
Mode:	18.00 µm	Skewness:	3.719 Right skewed
d ₁₀ :	1.863 µm	Kurtosis:	19.58 Leptokurtic
d ₅₀ :	10.29 µm		
d ₉₀ :	65.36 µm		
Specific Surf. Area	11732 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.863	3.788	15.51	28.66	65.36

22140#.\$02

Particle Diameter µm	Volume %
1.000	10.1
2.000	20.3
5.000	17.6
10.00	9.82
15.00	7.54
20.00	5.44
25.00	12.9
50.00	3.33
60.00	0.94
63.00	1.95
70.00	3.50
90.00	2.41
125.0	2.22
250.0	0.59
500.0	0
1000	0



Volume Statistics (Arithmetic) 22141.\$02

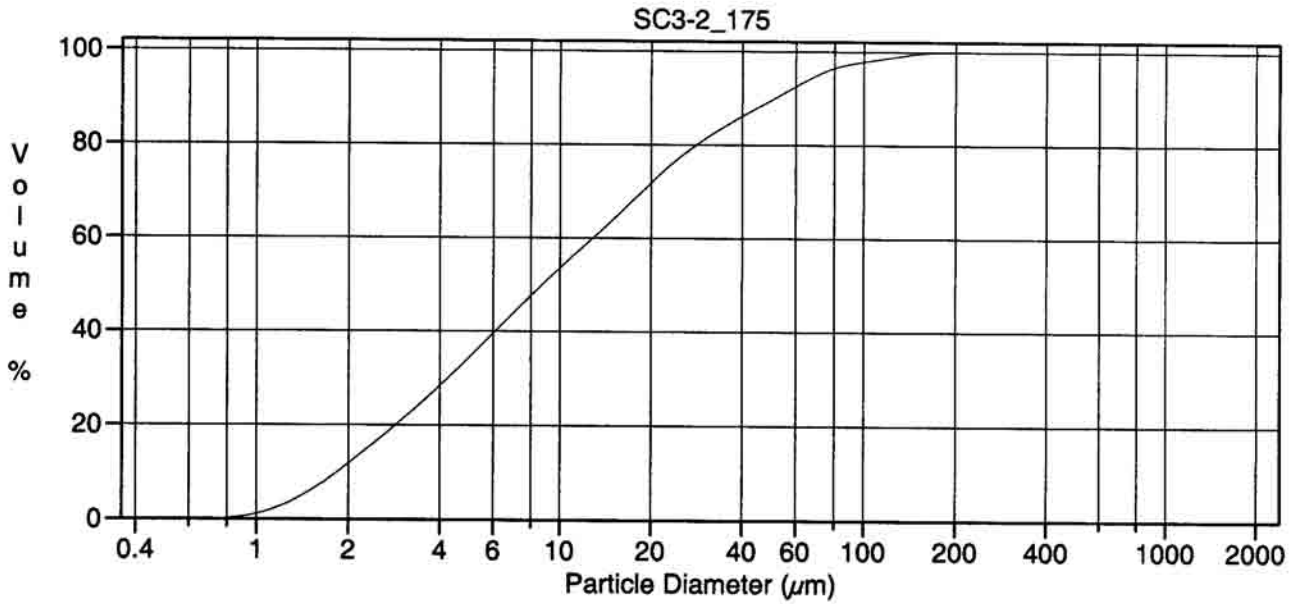
Calculations from 0.375 µm to 2000 µm

Volume	100.0%			
Mean:	22.96 µm	95% Conf. Limits:	0-83.09 µm	
Median:	9.946 µm	S.D.:	30.68 µm	
D(3,2):	5.090 µm	Variance:	941.2 µm ²	
Mean/Median Ratio:	2.308	C.V.:	134%	
Mode:	5.878 µm	Skewness:	2.331 Right skewed	
d ₁₀ :	1.868 µm	Kurtosis:	6.164 Leptokurtic	
d ₅₀ :	9.946 µm			
d ₉₀ :	64.46 µm			
Specific Surf. Area	11788 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.868	3.711	15.17	28.61	64.46

22141.\$02

Particle Diameter µm	Volume %
1.000	10.2
2.000	21.0
5.000	17.8
10.00	9.60
15.00	7.30
20.00	5.25
25.00	12.7
50.00	3.55
60.00	1.02
63.00	2.11
70.00	3.79
90.00	2.51
125.0	2.04
250.0	0.00011
500.0	0
1000	0



Volume Statistics (Arithmetic)

22142.\$02

Calculations from 0.375 µm to 2000 µm

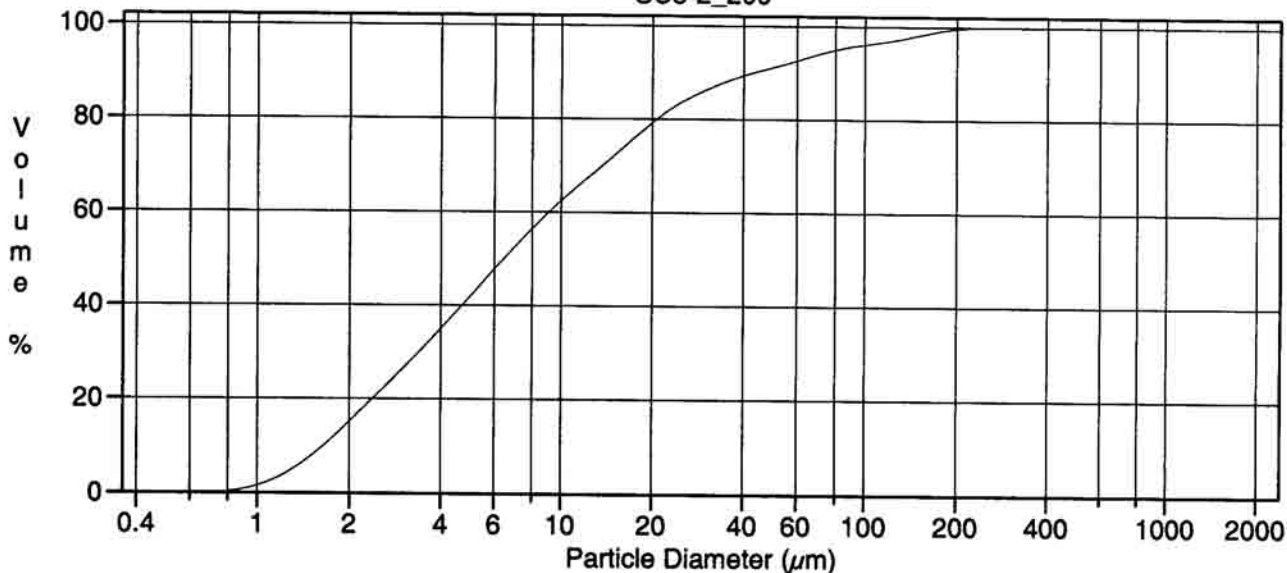
Volume	100.0%			
Mean:	18.82 µm	95% Conf. Limits:	0-68.48 µm	
Median:	8.736 µm	S.D.:	25.33 µm	
D(3,2):	4.834 µm	Variance:	641.8 µm ²	
Mean/Median Ratio:	2.155	C.V.:	135%	
Mode:	5.878 µm	Skewness:	2.661 Right skewed	
d ₁₀ :	1.833 µm	Kurtosis:	8.621 Leptokurtic	
d ₅₀ :	8.736 µm			
d ₉₀ :	51.27 µm			
Specific Surf. Area	12411 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.833	3.504	12.87	22.62	51.27

22142.\$02

Particle Diameter µm	Volume %
1.000	10.7
2.000	22.5
5.000	19.2
10.00	10.4
15.00	7.85
20.00	5.58
25.00	12.2
50.00	2.92
60.00	0.80
63.00	1.57
70.00	2.42
90.00	1.50
125.0	1.17
250.0	0
500.0	0
1000	0

SC3-2_200



Volume Statistics (Arithmetic)

22143.\$02

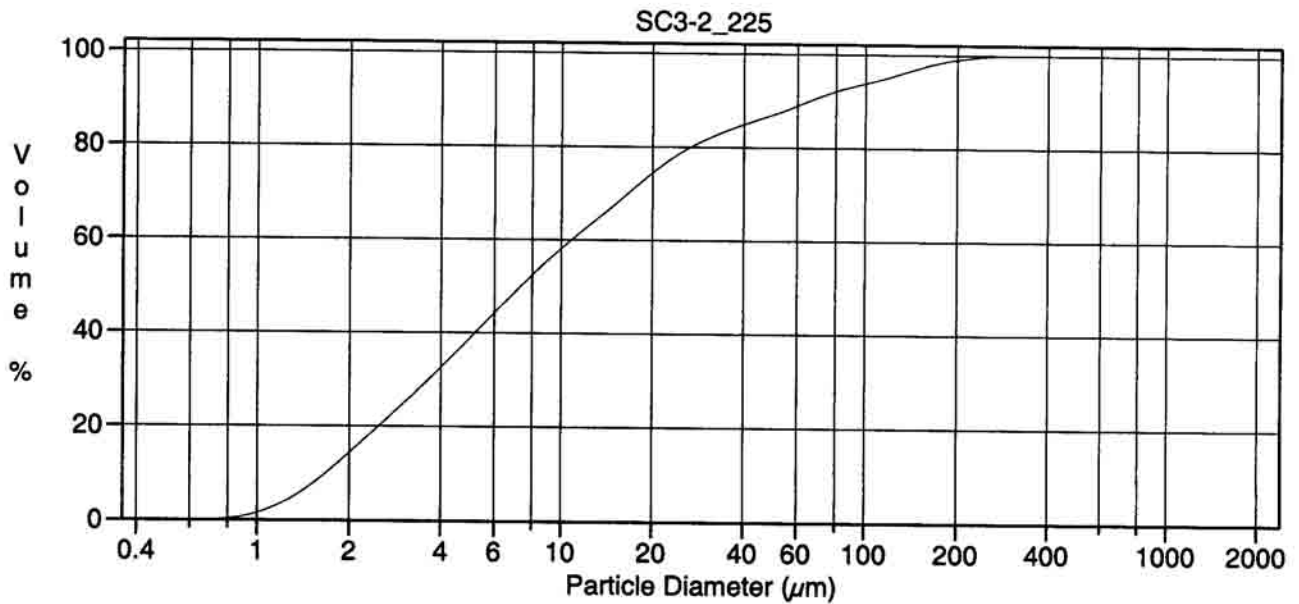
Calculations from 0.375 µm to 2000 µm

Volume	100.0%		
Mean:	17.90 µm	95% Conf. Limits:	0-80.84 µm
Median:	6.459 µm	S.D.:	32.11 µm
D(3,2):	4.089 µm	Variance:	1031 µm ²
Mean/Median Ratio:	2.771	C.V.:	179%
Mode:	5.355 µm	Skewness:	3.590 Right skewed
d ₁₀ :	1.640 µm	Kurtosis:	14.38 Leptokurtic
d ₅₀ :	6.459 µm		
d ₉₀ :	43.19 µm		
Specific Surf. Area	14673 cm ² /ml		

% <	10	25	60	75	90
Size µm	1.640	2.846	9.109	16.82	43.19

22143.\$02

Particle Diameter µm	Volume %
1.000	13.6
2.000	26.8
5.000	20.5
10.00	9.72
15.00	7.00
20.00	4.44
25.00	7.52
50.00	1.46
60.00	0.43
63.00	0.92
70.00	1.72
90.00	1.44
125.0	2.87
250.0	0.026
500.0	0
1000	0



Volume Statistics (Arithmetic) 22144.\$02

Calculations from 0.375 µm to 2000 µm

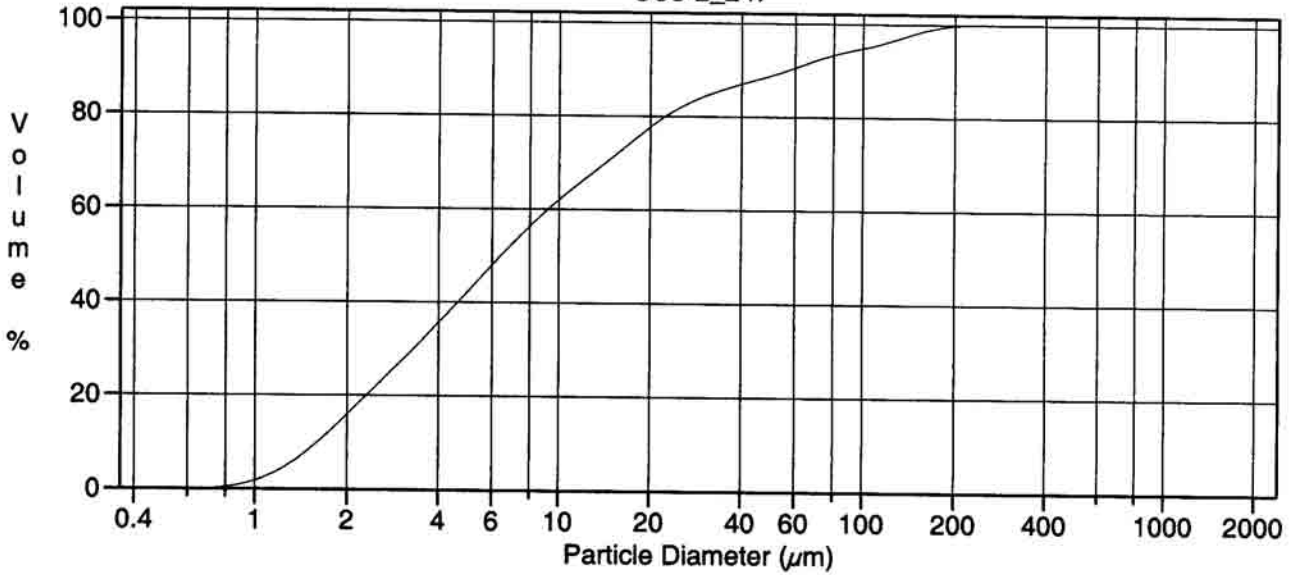
Volume	100.0%			
Mean:	22.93 µm	95% Conf. Limits:	0-101.4 µm	
Median:	7.337 µm	S.D.:	40.03 µm	
D(3,2):	4.335 µm	Variance:	1602 µm ²	
Mean/Median Ratio:	3.125	C.V.:	175%	
Mode:	5.355 µm	Skewness:	3.126 Right skewed	
d ₁₀ :	1.672 µm	Kurtosis:	10.91 Leptokurtic	
d ₅₀ :	7.337 µm			
d ₉₀ :	65.64 µm			
Specific Surf. Area	13839 cm ² /ml			

% <	10	25	60	75	90
Size µm	1.672	3.027	10.80	20.49	65.64

22144.\$02

Particle Diameter µm	Volume %
1.000	12.8
2.000	24.5
5.000	19.2
10.00	9.44
15.00	6.87
20.00	4.50
25.00	8.09
50.00	1.94
60.00	0.57
63.00	1.22
70.00	2.33
90.00	2.47
125.0	4.19
250.0	0.26
500.0	0
1000	0

SC3-2_247



Volume Statistics (Arithmetic)

22145.\$02

Calculations from 0.375 μm to 2000 μm

Volume	100.0%			
Mean:	19.70 μm	95% Conf. Limits:	0-86.92 μm	
Median:	6.427 μm	S.D.:	34.30 μm	
D(3,2):	4.023 μm	Variance:	1176 μm^2	
Mean/Median Ratio:	3.065	C.V.:	174%	
Mode:	5.355 μm	Skewness:	3.031 Right skewed	
d ₁₀ :	1.598 μm	Kurtosis:	9.626 Leptokurtic	
d ₅₀ :	6.427 μm			
d ₉₀ :	56.70 μm			
Specific Surf. Area	14916 cm^2/ml			

% <	10	25	60	75	90
Size μm	1.598	2.765	9.216	17.78	56.70

22145.\$02

Particle Diameter μm	Volume %
1.000	14.2
2.000	26.4
5.000	19.7
10.00	9.06
15.00	6.55
20.00	4.20
25.00	6.99
50.00	1.73
60.00	0.51
63.00	1.08
70.00	1.99
90.00	2.34
125.0	3.50
250.0	0.013
500.0	0
1000	0